

COAL AGE

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THE COMING TEST

BY FLOYD W. PARSONS

THE Government is fully aware that a lack of transportation facilities is the danger point in our war activities. This restriction on our efforts is certainly going to be removed. We will soon have ships, locomotives and cars. Also, each passing day will see the further development of a national transportation plan that will soon put America on an efficient coöperative basis.

What relation has all this to coal mining? Just this:

With plenty of locomotives and cars available, will our coal mines meet the test that will surely be put upon them? The Nation proposes to spend 15 billion dollars for war in 1918. This is all in addition to our peaceful pursuits. It means the consumption of millions of tons of coal more.

WE HAVE boasted of our coal-production capacity. "No cars" has always been our answer to those who charged there was deficient output. The last nine months of this year we will have to average better than 62 million net tons monthly to meet the known demand.

The request of the Fuel Administration that coal miners be placed on a preferential list has been denied by the military authorities. More men will be taken by Uncle Sam. Already close to 40,000 miners have been enlisted, and competent men to fill the vacancies created are not secured and trained in a day.

Is the industry properly organized to draw labor from less essential fields if the need becomes urgent? Individualistic action does not get far these days. Powerful concerted effort alone counts. Watch must be kept on other industries as never before. Wage advances in other lines will quickly reduce mine labor.

THE mines are not exactly the place for women. However, we must remember that five men are needed here to supply each soldier in France. Two million men at the front mean a withdrawal of 12,000,000 men from productive industries.

It follows then that we are withdrawing from peaceful and constructive pursuits for war work one-third of the total number of wage earners in America. How else can we supply the labor deficit thus created if not by drawing from the ranks of the 26,000,000 idle women in the country? Such help might not be used largely underground, but it could be employed in most lines on the surface. Objections worth considering in normal times are out of order now; we must finish the job on hand no matter what the cost.

THERE is but one way for the coal-mining business to avoid landing in the lap of Government ownership, and that is by making good in such substantial fashion that all criticism of coal production will be stilled. Let us ship clean coal. Every per cent. additional ash in the nation's output means an added requirement of 126,000 railroad cars, without any increase in heat values. Let us not relax the observance and enforcement of safety measures. Remember 1917 showed an increase of 21 per cent. in mine fatalities! Let us keep mine development ahead of requirements—see that at least one-eighth of the tonnage comes from narrow work. Let us also keep up repairs and increase productive capacity by the installation of every machine or mechanical device that will serve that end.

The test may come sooner than we expect. Are we ready?

IDEAS AND SUGGESTIONS

Mine Telephone Systems

BY FRANK HUSKINSON
Lafayette, Colo.

It is important that a coal mine should possess a reliable telephone system, one that makes connection also with the outside works. In fact such a system is a necessity.

The saving in time and money which such a system effects by reliably transmitting routine orders or instructions when there is a temporary suspension of power, a shutdown of some part of the plant, an accident, or an emergency affecting either life or property, justifies many times over the investment required.

Mine telephone systems usually consist of several instruments connected to one pair of wires (or one wire and the ground), forming a party line. Local-battery magneto telephones are used, and signaling is effected by a code of rings. The severe conditions encountered underground because of moisture, gases, acidulous water, etc., make it necessary to provide un-

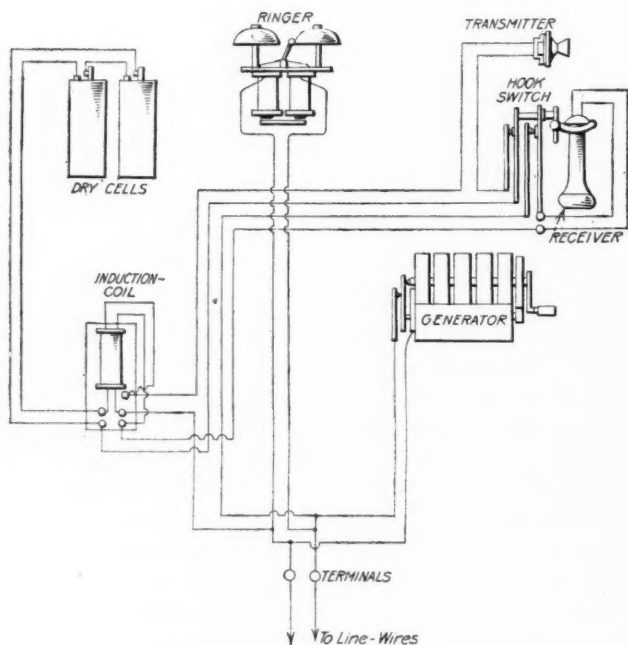


FIG. 1. CONNECTIONS AND PARTS OF STANDARD MINE TELEPHONE

usually well-protected telephone instruments for this service. For use aboveground a standard wall or desk telephone is practical.

All telephones underground are inclosed in a heavy metal case, which is fireproof, moisture-proof, and fool-proof. The gongs on all mine telephones are extra large and loud-sounding; they emit a distinct ring which can be heard a long distance. In Fig. 1 is shown the

connections and various parts of a standard local-battery magneto mine telephone.

With the local-battery magneto telephone system any number of instruments can be connected in multiple to one pair of wires. It is not advisable, however, to connect more than 8 or 10 telephones to the same set of wires, as it will make the ringing code of signals too complex. Also, in case of trouble, it is more difficult to locate.

In mines where there are a number of telephones it is advisable to have the instruments separated into

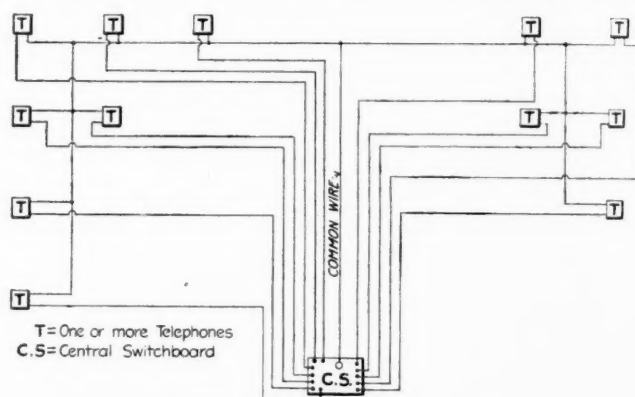


FIG. 2. WIRING DIAGRAM, TELEPHONES AND SWITCHBOARD

groups of one, two, or more, each group having one line wire to the central switchboard, also one line wire to the common wire that runs from the switchboard to each group of telephones (see Fig. 2). The use of the common wire is to save material. It gives as satisfactory service as though there were two line wires from each group of telephones. In a system with several telephones connected to one pair of wires, each station may call and talk to any other station on the line without the aid of a switchboard and operator; also, in this system, where the telephones are in groups the lines from these groups run to the surface and are centralized upon a switchboard. Any one group of telephones may be operated independently and without the services of the switchboard operator. The object of the switchboard is to make a connection between any two telephones in different groups.

An injury to a telephone, an open-circuit or a short-circuit in a section of the line will not interfere with the operation of the rest of the system, and it is a more simple matter to locate any trouble in the system than if all the telephones were connected to one pair of line wires.

The telephones used in the local-battery magneto system are equipped with two or three dry cells. The current furnished by these cells is used for talking purposes only. The current for ringing the bells on the other telephones on the same line and also for signaling the switchboard is generated by the hand generator,

more commonly called the magneto. The current thus generated is alternating and has nothing to do with the talking and hearing parts of a telephone. The dry cells similarly have nothing to do with the ringing of the bells.

Local-battery magneto telephones will operate on a circuit consisting of one wire and the earth, but this is not recommended. For various reasons ground-return circuits are objectionable, especially in mines where electricity is used, since the telephones become noisy owing to foreign currents. The metallic circuit is to be recommended in all installations. This is more expensive to install, but the difference is more than offset by the reliability and efficiency gained.

There is a tendency to neglect telephone lines. The idea is prevalent that almost any kind of wire and material is good enough for a telephone line. This is a mistake. Telephone-line construction should receive as much attention as any other class of wiring; telephone lines underground should be carefully and securely installed to insure satisfactory results. The use of No. 12 weatherproof iron wire is recommended for all underground installations. The wires should be supported on porcelain knobs or glass insulators. Care should be taken to insulate and secure the lines from contact with other lines or pipes that may parallel or cross them. In the case of power lines that parallel telephone lines for any considerable distance, the foreign currents caused by induction make the telephones noisy. To

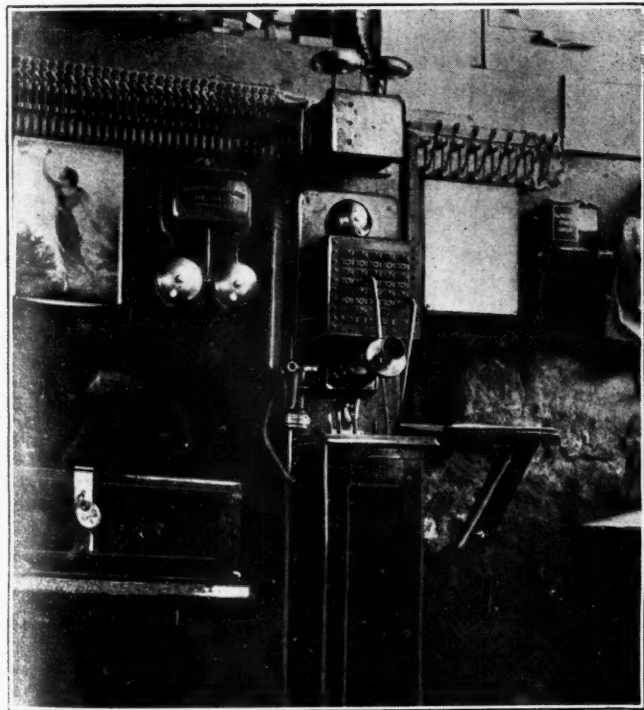


FIG. 3. MINE TELEPHONE SWITCHBOARD

diminish this noise it is necessary to transpose the telephone lines at frequent intervals and keep them as far away as practical from the power lines.

All joints in telephone lines should be securely made, soldered and insulated. In Fig. 3 is shown a satisfactory mine telephone switchboard that is in use at one of the largest mines in the State of Colorado. This system was the only system that ever gave satisfactory results at this mine. The switchboard has 15 drops, and

two sets of connecting plugs. At the left is the fuse, lightning arrester and terminal board. To this board all the various line wires come, and in case of trouble it can easily be determined from this point just what line the trouble is on. The fuse is then taken out, thereby cutting off the line that has the trouble on it.

When a call comes in on the switchboard the drop falls out, closing a local bell circuit. This bell rings until the drop is restored by inserting the plug. The operator answers the call and makes the proper connection. At the right of the switchboard are several small single-pole switches, the object of which is to connect all or part of the various groups of telephones at night, or whenever the switchboard operator is absent.

This installation is located in the electrical repair shop, and the calls are taken care of by the shop foreman in the day time, and at night the switches are put in, thereby connecting all the telephones together, allowing any station to call and talk with any other station without the services of the switchboard operator.

A Convenient Table for Draftsmen

BY P. A. ARNOLD

St. Marys, Penn.

In figuring areas from maps, either by scale or planimeter, the accompanying table will be found convenient and quite a time saver. Requests for areas of tracts of land and also sections of underground workings continually come to the engineering department of any large coal company.

This table is, of course, small in itself; but nevertheless it is a short cut in calculating that which is not often tabulated and ready for use.

An explanation for the use of the table is hardly necessary, but to illustrate: Suppose one wishes to find

TABLE OF AREAS

Number of Square Feet and Number of Acres per Square Inch at the Following Scales

Scale	Square Feet	Acres
100 ft. = 1 in.	10,000	0.2296
200 ft. = 1 in.	40,000	0.9183
300 ft. = 1 in.	90,000	2.0661
400 ft. = 1 in.	160,000	3.6731
500 ft. = 1 in.	250,000	5.7392
600 ft. = 1 in.	360,000	8.2644
700 ft. = 1 in.	490,000	11.2488
800 ft. = 1 in.	640,000	14.6924
900 ft. = 1 in.	810,000	18.5950
1,000 ft. = 1 in.	1,000,000	22.9568
1/4 Mile = 1 in.	.....	40.0000
1/2 Mile = 1 in.	.....	160.0000
3/4 Mile = 1 in.	.....	360.0000
1 Mile = 1 in.	.....	640.0000

the acreage of a piece of land which by measurement shows 12.7 sq.in. of area, the scale of the map being 200 ft. to the inch. He refers to the table and finds that 1 sq.in. at the above scale is equal to 0.9183 acre, and that therefore 0.9183×12.7 , or 11.66+ acres, is the required answer.

IN THE BUILDING OF FIRES in locomotives, a considerable saving of wood and coal can be made if the following method is used: On top of the grate place a layer of dry shavings 1 in. thick. On top of this place a layer of 4 or 5 in. of coal, and on top of the coal another layer of dry shavings 1 in. thick. As this method of laying the fire prevents the passage of air through the material, it is necessary to make an opening down the center of the fire for the passage of air. The bottom layer of shavings prevents coal from falling through the grate, therefore saving fuel and preventing it igniting in the fire pan and shortening its life.



The Utilization of Anthracite Culm

By M. S. HACHITA

Chemist, Lehigh Valley Coal Co., Wilkes-Barre, Penn.

THE insistent demand for more coal during the past year, and particularly this winter, has been beyond the capacity of the mines to supply. This inability to increase the output has taught the anthracite operators to practice a more strict economy at their power plants, to stop all wastage of fuel, to prevent leakage of steam and to utilize a byproduct that was previously considered as waste. In accord with this idea, the Lehigh Valley Coal Co. has perfected a method by which the anthracite culm mixed with bituminous coal can be utilized as a commercial fuel.

It is due to the foresightedness and unfailing enthusiasm of F. M. Chase, vice president and general manager of the company, that the utilization of anthracite "slush" has become an accomplished fact. The slush mixture has brought out another factor which was heretofore never thought of—that is, the evaporative power of this fuel does not depend entirely on the heat content of the coal, but directly upon the mechanics of a more complete combustion. This is clearly shown by the results of tests made on stationary boilers and on locomotives.

CULM FORMERLY CONSIDERED USELESS

In the mining and preparation of anthracite a certain amount of fine material is produced which is known as culm, slush or silt. This is material which passes through a screen of $\frac{1}{8}$ - or $\frac{1}{16}$ -in. mesh and is so fine that, heretofore, it was considered as a useless byproduct of the industry, except in some instances where it is taken into the mine and deposited in old workings in order to support the roof. It is also used to a small extent in making briquets. Aside from these uses it has been a nuisance to the operator, as he experienced great difficulty in disposing of it.

This material contains approximately 80 per cent. of combustible matter. It therefore has a fuel value approximately equal to that of commercial anthracite. In 1913 the Lehigh Valley Coal Co. conducted a series of experiments at its Spring Brook boiler plant, near Hazleton, Penn., with the view of utilizing this culm.

For this purpose were arranged four cylindrical boil-

ers, 33 in. in diameter and 30 ft. long; one smoke stack, 33 in. in diameter and 33 ft. high; a total grate area of 132 sq.ft., having an air space of 19.8 sq.ft., or 15 per cent. of the total area.

The feed water was measured in three barrels, elevated 10 ft. above the ground. Directly under these were five barrels, connected in series, into which the measured water was discharged. The water was fed into the boilers by means of an injector. The steam was exhausted into one of the stacks through a 2-in. pipe. The pressure of the steam was maintained at 60 lb. throughout the tests. Forced draft was produced by means of a small fan, with a pressure of $\frac{1}{2}$ -in. water gage. The temperatures of the feed water and air were

TABLE I. ANALYSES OF FUEL

	Hygro. Moist.	Moist.	Volatile	Carbon	Ash	B.t.u.
Coking coal.....	0.0	0.71	24.48	60.07	14.74	13,005
Noncoking coal.....	4.90	2.14	25.06	62.45	10.35	13,210
Culm.....	8.50	1.85	4.40	68.70	25.05	10,772
Spring Brook boiler fuel.....	0.0	3.25	2.99	75.80	17.96	11,304

recorded; that of the stack averaged 750 deg. F. The amount of CO₂ in the flue gases was determined by the Orsat apparatus.

In this test the fuel consisted of culm and bituminous coal. These were weighed on a platform balance before being fired, and the ashes were weighed after each test.

From Apr. 23 to 26 inclusive the fuel was fired in alternate layers of soft coal and culm, also a thorough

TABLE II. ANALYSES OF ASHES

	Mois- ture	Volat- ile	Car- bon	Ash	B.t.u.
"A" Coking coal.....	0.79	1.45	33.73	64.02	4,834
"B" Noncoking coal.....	0.99	3.84	45.10	50.07	7,216
"C" Culm.....	1.32	1.09	54.04	43.55	7,888
"D" Anthracite boiler fuel.....	0.67	1.51	38.23	59.59	5,642
"A" 30 per cent.—"C" 70 per cent., run-of-mine.....	0.96	0.77	40.83	57.44	5,904
"A" 50 per cent.—"C" 50 per cent., run-of-mine.....	1.12	2.01	39.75	57.12	6,048
"A" 70 per cent.—"C" 30 per cent., run-of-mine.....	0.84	0.72	31.24	67.20	4,428
"A" 30 per cent. pulverized	0.78	1.28	35.41	62.53	5,383
"C" 30 per cent. pulverized	0.67	1.26	32.15	65.92	4,768
"A" 50 per cent. pulverized	0.32	0.34	17.03	82.31	2,628
"C" 50 per cent. pulverized	0.57	1.80	43.52	54.11	6,662
Noncoking coal 50 per cent.	0.78	2.20	42.77	54.25	6,591
Noncoking coal 70 per cent.	0.50	1.28	42.03	56.19	6,453
Noncoking coal 80 per cent.					
"C" 20 per cent.					

mixture of both fuels in various proportions. It was soon discovered that the thorough mixture of culm with bituminous coal was the better method, and it was therefore used throughout the tests. Tables I and II show the analyses of the fuels used in the tests and also of the resulting ashes.

In order to determine the basis for comparison, each fuel was burned alone. Table III shows the results of these tests. The figures in the first column were obtained from burning coking coal alone; the second column, noncoking coal alone; the third column, culm alone. To compare these figures directly, the temperatures of the draft were corrected to 60 deg. F., and the fuel is calculated on a dry basis.

The first series of tests consisted of 30, 50 and 70 per cent. of run-of-mine coking coal mixed with 70, 50 and 30 per cent. of culm from the Hazleton shaft colliery. The results of these tests are found in columns E, F and G. Since the soft coal contained a great many lumps, the large pieces were crushed with a hammer, and the biggest ones in the mixtures were not larger than the size of egg coal. Both fuels were thoroughly mixed in the proper proportions with shovels before firing.

After the foregoing tests were over, the soft coal was crushed to pass through a 1-in. screen. It was then mixed with culm in the same proportions as before and fired. The results of these tests are found in columns H, I and J. At the conclusion of these tests, the old Spring Brook boiler fuel was fired to determine the relative values in evaporation of the water. The results of this test are found in column D.

RESULTS OF SECOND SERIES OF TESTS

The second series of tests consisted of noncoking coal mixed with the culm in the following proportions: 50, 70, 80 and 100 per cent. of bituminous with 50, 30, 20 and 0 per cent. of culm. The results of this test are given in columns B, K, L and M.

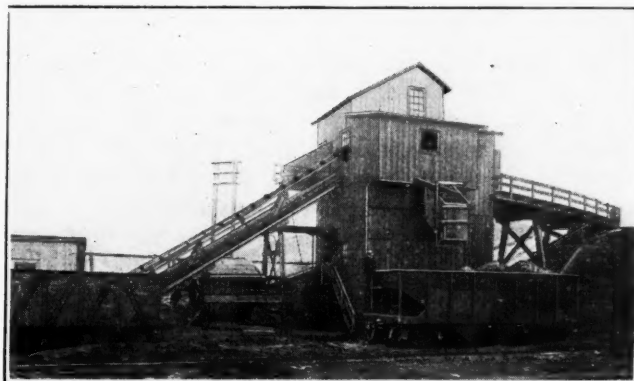
The figures on line 16 show the number of pounds of water evaporated from and at 212 deg. F. per pound of dry fuel, the temperature of the draft being corrected to 60 deg. F. After deducting the water evaporated by the soft coal in the mixtures, the remainder is credited to that which was evaporated by the culm (see line 17). It will be noticed that the best results were obtained when the culm was mixed with pulverized coking coal. The amount of water evaporated, shown in column J, was 5.92 lb., or 99.38 per cent. of the water evaporated by the soft coal alone, which was 5.957 pounds.

The reason why coking coal is better adapted to mix with culm lies in the fact that the coking coal fuses at a comparatively low temperature and the fusion takes up the particles of the culm, forming a homogeneous mass of fuel which burns uniformly. It was also noticed that the mixture was easier to burn than was soft coal alone. This is due to the fact that when soft coal alone is burned, the fuel bed becomes a hard mass requiring considerable poking to effect complete combustion, whereas in the case of the mixed fuel the coked mass is more easily handled by the fireman as it breaks up into small pieces with less labor, thereby increasing the speed and quality of the combustion. The noncoking coal on the other hand does not fuse and therefore burns independently of the culm. It will be observed

from the results of these tests that the culm can be commercially utilized in a furnace where bituminous coal is now being used, such as large factories, railway locomotives and ocean liners.

In September, 1917, the Lehigh Valley Railroad Co. tried the formula of mixed fuel on its stoker engines running between Hazleton and Lehigh, a distance of 26.2 miles. Both Standard and Street stoker engines were used. The train consisted of 50 cars of coal taken from the Hazleton region to Lehigh, the return to Hazleton being made with 65 empty cars.

The condition of the tracks between the points above mentioned was such that all the haul to the east was down grade while that to the west was up grade. All eastbound trains stop at Hazle Creek Junction and inspect and test air brakes. On leaving Hazle Creek Junction, the hand brakes were applied 100 per cent. Both hand and air brakes were used to control the train from Hazle Creek Junction to Black Creek Junction, the grade being such that both devices were required in order to control the train between the points mentioned. The hand brakes were released at the latter



MIXING PLANT AT HAZLETON, PENN.

junction and from there on east the train was controlled by air brakes.

On the return trip from Lehigh, the engine pulled the train to Penn Haven Junction by its own power. At this point one engine helper was added to the train on the rear. This helper was necessary on account of the grade up to Black Creek Junction, at which point a second engine helper was required to push the train against a heavy grade up to Hazle Creek Junction. This made a total of three engines to the train. At the latter junction the second engine was taken off and the train proceeded to Ashmore with two engines, where the first engine helper was also taken off. This description is made to show the physical condition of the tracks on which the tests were conducted.

When the train first started from Hazleton on the first trip, the fireman seemed to have a little trouble in maintaining the steam pressure. This was due to two causes; first, the fireman was not used to this grade of fuel, and second, the stoker apparatus on the locomotive was not in good working order. As a result the mixed fuel was not properly distributed in the combustion zone and the thickness of the burning fuel bed was not sufficient to obtain the full burning capacity of the coal. However, the fuel burned well and the pressure of the steam was maintained between 140 and 185 lb. until the

TABLE III. RESULTS OF CULM-BURNING TESTS WITH BITUMINOUS COAL

Spring Brook Boiler Plant, Lehigh Valley Co., Wilkes-Barre, Penn.

	A	B	C	D	E			F			G			H			I			J			K			L			M
	Coking Coal	Non-Coking Coal	Culm, Hazleton Shaft	Spring Brook Boiler Fuel	Coking Coal Run-of-mine			Coking Coal Pulverized			Coking Coal Pulverized			Coking Coal Pulverized			Coking Coal Pulverized			Coking Coal Pulverized			Noncoking Coal Run-of-mine			Noncoking Coal Run-of-mine			M
					30 Per Cent. A	50 Per Cent. A	70 Per Cent. A	30 Per Cent. A	50 Per Cent. A	70 Per Cent. A	30 Per Cent. C	50 Per Cent. C	70 Per Cent. C	30 Per Cent. C	50 Per Cent. C	70 Per Cent. C	30 Per Cent. C	50 Per Cent. C	70 Per Cent. C	30 Per Cent. C	50 Per Cent. C	70 Per Cent. C	30 Per Cent. C	50 Per Cent. C	70 Per Cent. C	30 Per Cent. C	50 Per Cent. C	70 Per Cent. C	
1. Weight of fuel, lb.	4,200	10,200	3,500	4,200	5,400	4,800	4,200	5,400	4,800	4,200	5,400	4,800	4,200	5,400	4,800	4,200	5,400	4,800	4,200	5,400	4,800	4,200	5,400	4,800	4,200	5,400	4,800	4,200	5,400
2. Weight of dry fuel, lb.	4,170	9,492	3,215	4,063	5,080	4,588	4,076	5,080	4,588	4,076	5,080	4,588	4,076	5,080	4,588	4,076	5,080	4,588	4,076	5,080	4,588	4,076	5,080	4,588	4,076	5,080	4,588	4,076	5,080
3. Weight of feed water, lb.	22,518	42,534	6,260	13,761	15,846	18,780	19,599	17,514	20,016	24,603	13,176	15,308	45,752	23,995															
4. Water evaporated from and at 212 deg. Fahr.	25,716	48,950	7,236	15,823	18,379	21,707	22,653	20,209	23,093	28,363	15,308	45,752	23,995																
5. Water evaporated from and at 212 deg. Fahr. and temperature of air corrected to 60 deg. Fahr.	24,841	50,602	7,420	15,728	18,519	22,032	21,815	20,569	23,119	28,867	17,315	46,368	24,745																
6. Weight of ash, lb.	933	2,329	1,332	1,231	1,625	1,229	1,115	1,514	1,165	1,338	1,411	2,609	1,185																
7. Per cent. of ash	22.21	22.28	38.06	29.21	30.09	25.60	26.55	28.04	24.27	26.76	24.75	23.72	21.94																
8. Steam pressure, lb.	60	60	60	60	60	60	60	60	60	60	60	60	60																
9. Temperature of feed water	70	61	56	62	56	56	66	58	58	59	50	63.1	61																
10. Temperature of air	81	54	64	66	65	59	83	61	66	50	42	62	55																
11. Percentage of CO ₂ in F gases	7.2	7.1	6.0	6.4	7.0	8.0	7.5	6.4	7.0	8.0	7.0	8.0	9.0																
12. Efficiency of combustion	91.68	86.89	70.22	84.88	83.77	86.82	90.34	85.74	89.98	94.20	85.19	87.11	86.78																
13. Percentage of heat converted into steam	45.53	39.55	21.03	34.28	31.33	39.09	42.71	36.02	41.76	47.66	27.15	36.02	38.01																
14. Percentage of heat lost in ash	8.32	13.11	29.78	15.12	16.23	13.18	9.66	14.26	10.02	5.80	14.81	12.89	13.22																
15. Percentage of heat lost through stack, etc.	46.15	47.34	49.19	50.60	52.44	47.73	47.63	49.72	48.22	46.54	58.04	51.09	48.77																
16. Pounds of water evaporated from and at 212 deg. F. per lb. of dry fuel. Air condition corrected to 60 deg. Fahr.	5.957	5.331	2.308	3.871	3.646	4.802	5.352	4.049	5.039	5.948	3.326	4.580	4.941																
17. Pounds of water evaporated from and at 212 deg. Fahr. per lb. of dry culm. Air condition corrected to 60 deg. Fahr.			2.308		2.575	3.553	3.824	3.166	4.046	5.920	1.243	2.759	3.311																
18. Pounds of fuel burned per sq. ft. of grate per hr.	5.30	6.54	4.42	5.30	6.82	6.06	5.30	6.82	6.06	6.31	9.59	7.39	8.18																
19. Boiler-horsepower developed	120.0	117.0	36.0	76.0	89.0	106.0	115.0	99.0	112.0	139.0	112.0	119.0	125.0																

train was pulled into Hazleton, thus completing the first trip.

The second trip was started late in the afternoon of Sept. 28, using the same engine. A representative of the Standard stoker firm was present on this trip and adjusted the defects in the stoker. The train, consisting of 50 cars of coal, was pulled out of Hazleton in the usual manner with the stoker in proper working condition and with the same fireman as on the first trip. Profiting by the experience gained on the first trip, no trouble of any kind was met with in maintaining the working pressure of the steam, which was between 150 and 185 lb. The return trip was made with 60 empty cars and the run proved entirely satisfactory.

The third trip was made on the evening of Sept. 29 with the same engine, this time burning pure soft coal. This was done in order to compare the evaporation of water per pound of different fuels burned. The train consisted of 49 cars loaded with coal, with a gross weight of 3100 tons, and the return was made with 50 empty cars weighing 960 tons. During this trip the engine consumed 128,550 lb. of water at 58 deg. F., while the weight of the fuel burned was 26,550 lb. This is equivalent to 4.84 lb. of water at 58 deg. F. evaporated per pound of fuel.

The fourth trip was made on Sept. 30 with the Street stoker engine No. 341. The fuel used in this test consisted of 30 per cent. of culm and 70 per cent. of stoker coal. As it was Sunday there were only 38 cars of coal available. These weighed 2287 gross tons. The return trip was made up of 70 empty cars weighing 1222 tons. The fuel burned well, producing plenty of steam. The total amount of water evaporated in the run was 117,800 lb. at 58 deg. F., while 18,550 lb. of mixed fuel was consumed. This is at the rate of 6.35 lb. of water evaporated per pound of fuel.

The fifth trip was made on Oct. 1 on hand-fired engine No. 337, burning a mixture of 40 per cent. culm and 60 per cent. of run-of-mine coking coal. The load consisted of 50 cars of coal weighing 3394 tons, and the return was made with 66 empty cars weighing 1200 tons. The fuel burned well and the working pressure of the steam

was maintained throughout the trip. The total amount of water evaporated during this trip was 126,250 lb. at 58 deg. F., while the consumption of fuel amounted to 20,550 lb. This is equivalent to 6.14 lb. of water evaporated per pound of mixed fuel.

Table IV is a tabulation of the evaporation tests made on the different engines with the various fuels.

It will be noticed in Table IV that the fuel burned on engine 351 contained more heat units than that contained in the mixed fuel used on the other two engines. Yet the amount of water evaporated by this locomotive is much less than the other engines Nos. 341 and 337, both burning mixed fuel having a less theoretical quantity of heat.

A reduction of the amount of smoke now being produced by ocean steamers can be accomplished through the use of a mixture of soft coal and anthracite culm; furthermore the use of such a mixed fuel would not only reduce the amount of smoke but also the cost of the fuel.

From experiments, the best results can be obtained from 30 per cent. of culm thoroughly mixed with 70 per cent. of pulverized coking coal. This proportion of the fuel mixture will produce a heat efficiency equal to or greater than that produced by the same weight of soft coal. This is due to the fact that, as pointed out above, the mixed fuel burns more evenly so that the volatile matter in the soft coal has a better chance for more complete combustion. As a consequence, the mixed fuel, containing the above proportions, produces approximately 50 per cent. of the smoke made by bituminous coal only. The more culm the mixture contains the less will be the smoke produced.

The culm contains more ash than does the average bituminous coal, but this disadvantage is more than balanced by the fact that when mixed in the proper proportions it gives a better combustion and consequently produces more available heat than is produced by burning soft coal alone. This fact has been ascertained by experience.

Soft coal consists of two chief combustible ingredients—namely, fixed carbon and volatile hydrocarbons. The hydrocarbons contain approximately 85 per cent.

carbon and 15 per cent. of hydrogen. The evolution of hydrocarbon from soft coal is begun at a comparatively low temperature. This means that when a shovelful of soft coal is fired the quantity of smoke emanating from the smoke stack will be noticeable immediately. The reason for the appearance of this smoke lies in the fact that the volatile constituents in the fuel come out rapidly while at the same time the supply of oxygen in the combustion zone becomes so deficient directly over the fresh fuel that a greater part of the volatile combustible matter is distilled, liberating the carbon in a free state in the combustion zone; and as this travels toward the flues and thence to the smoke stack, its temperature falls. Under these conditions the carbon particles, thus distilled, condense and each particle attracts others to it and becomes larger and larger. Finally the resulting "flakes" have grown so large relatively that they become collectively visible as smoke.

Each particle of smoke that passes through the flues means that so much heat is lost. This is the actual condition found today on railroad engines using soft coal. The incomplete combustion of the volatile constituents in the bituminous fuel was responsible for the low efficiency of water evaporation in engine 351 given in Table IV. A cure for this defect in soft coal has been found in the anthracite culm mixture.

The culm consists of approximately the following sizes: Over 20 mesh, 50 per cent.; over 40, 22 per cent.,

TABLE IV. TESTS OF DIFFERENT ENGINES WITH VARIOUS FUELS

	Engine 351	Engine 341	Engine 337
Kind of fuel used.....	100 per cent. soft coal	{ 30 per cent. culm 70 per cent. soft coal	40 per cent. culm 60 per cent. soft coal
Weight of water used.....	128,550 lb.	117,800 lb.	126,250 lb.
Weight of fuel used....	26,550 lb.	18,550 lb.	20,550 lb.
Water evaporated per pound of fuel.....	4.84 lb.	6.35 lb.	6.14 lb.
Temperature of feed water	58 deg. F	58 deg. F	58 deg. F
Heat contained in each pound of fuel, B.t.u.	13,689	12,783	12,755
Fuel efficiency based on evaporation of water with 100 per cent. bituminous coal.....	100 per cent.	131 per cent.	127 per cent.

ANALYSES OF FUEL

	Hazleton Shaft Culm, Per Cent.	Soft Coal, Run-of-mine, Per Cent.	Soft Coal Stoker, Per Cent.
Moisture.....	2.15	0.75	0.32
Volatile matter.....	7.40	34.25	23.78
Fixed carbon.....	64.45	55.80	62.60
Ash.....	26.00	9.20	13.30
Total.....	100.00	100.00	100.00
B.t.u. (dry coal).....	10,617	14,181	13,689

and through 40, 28 per cent. The culm is unlike other grades of anthracite in that it is extremely fine; and when it is mixed with slack or stoker coal the subsequent handling would not disturb the homogeneity of the mixed fuel. Again the culm has per unit weight a larger surface exposed for combustion than barley, rice or buckwheat coal. Consequently the culm burns more quickly and evenly than commercial anthracite.

Since coking coal and culm were used in these tests, the burning fuel produced a mass of porous, spongy coke; and being porous, the coked mass burned out in a comparatively short time. Right at this point it was observed that the culm and the bituminous coal in the mixture burned at the same rate. With an addition of

anthracite culm in the soft coal, the mixed fuel contains less volatile ingredients than does raw bituminous. Furthermore, with a fuel consisting of one-third culm and two-thirds soft coal, every two particles of soft coal has as its neighbor a particle of culm. Consequently the soft coal particles have a greater opportunity to obtain oxygen in the combustion chamber necessary for a more complete combustion. Thus the culm in the mixed fuel reduces the excess of volatile matter, which, if not diluted, will be distilled and a part of it expelled from the stack as smoke. The function of the culm addition to the bituminous coal, therefore, is to give the volatile constituents of the soft coal a more complete combustion, thereby preventing the emission of unburned hydrocarbons and securing more heat.

At the conclusion of the runs made on the different engines the railroad company decided to build a mixing plant. Construction began on Oct. 11, 1917, at Hazleton, Penn., and was completed in eleven days.

Upon arrival the bituminous coal is unloaded into a pit, from which it is raised to the plant by means of a dragline. After passing over the bar screens, with 3-in. openings, the coarse material is fed onto a crusher where it is sufficiently reduced to pass through a screen of 1-in. mesh. Both the screenings and the crushed coal are then dropped into a bin. The silt is brought from the slush bank at the Hazleton shaft operation in 5-ton cars and dumped into a bin at the plant.

The material from each bin is then gravitated to a revolving table located directly under the bins. The proper amounts of bituminous coal and slush are scraped from the tables and both ingredients drop onto a third revolving table where they are thoroughly mixed. It is again scraped off and discharged onto a chute; thence to elevator buckets where the mixed product is loaded into the cars from which the soft coal was unloaded. The machinery is driven by a 50-hp. motor.

The present capacity of the plant, under normal conditions, is approximately 100 tons per hour, but it is the intention of the company to make slight alterations this spring so that the capacity may be increased to from 150 to 200 tons per hour.

In Lighter Vein

High Cost of Mule

An Englishman came to this country some years ago on a visit. He was impressed with many things he saw, but particularly with our vast mineral resources, and expressed his opinion that he would like to invest in American coal lands. This news received good circulation, and soon he was presented with many opportunities for investment.

After going over sheaf after sheaf of legal and engineering data of a certain operation, he bought. One day the idea seized him that he might go and look over his purchase. Arriving at the mine, he saw a driver using his persuader on a mule, and the general appearance of the place prompted the following remark from the Englishman: "Say there, driver, quit abusing that mule; he cost \$40,000."

Coal Conservation

By DAVID MOFFAT MYERS

Advisory Engineer, United States Fuel Administration, Washington, D. C.

SYNOPSIS—*The coal shortage does not necessarily call for a power and heat shortage. If coal now available to the factories of the country were burned in such a manner as to extract from it the greatest amount of power possible, they would be confronted by no lack of fuel. The practice of true conservation, use without waste, can avoid the necessity of further interruptions to industries.*

THERE is an enormous and needless waste of coal in the United States. Coal is literally being thrown away in industrial plants, simply because it has been cheap, while coal in Italy is costing \$100 per ton and people in our own country are freezing because of coal shortage. Factories essential to the proper conduct of the war will have to shut down unless scientific methods for boiler management throughout the country are adopted, and unless private homes cooperate with and are guided by the Fuel Administration. The popular support accorded to Mr. Hoover and his food-saving campaign has made possible the great results accomplished. The same loyal support of Dr. Garfield and his conservation program will relieve the present shortage of coal. The new program is to "Hooverize" coal.

The factory power plant has heretofore been neglected. It has not received the close analytical attention which the management has bestowed upon the other departments of its business. In these other departments the intake and output are carefully and continuously recorded and exhaustive studies made to discover those means which will result in the maximum efficiency of production. The United States Fuel Administration warns all plant owners and managers that if they do not apply to their power plants the same degree of intelligent skill and attention which have produced high efficiency in other phases of their business, there will again come a time when it will be necessary to shut down a part of the industrial plants of the country on account of a shortage of fuel.

When that time comes some owners will by intelligent effort have succeeded in obtaining a high efficiency of operation in their steam plants. Others will still be running with great wastefulness. Strict limitation in the distribution of coal will be necessary. Obviously it will not be fair to the efficient plants to shorten their coal supply, while the bad plants continue to waste. All plants, then, may be classified by the Government either as "efficient" or "wasteful," and this classification used as a basis of coal distribution and limitation. Quick and concentrated action alone on the part of plant managers will prevent serious shortage, and this threatened regulation and limitation. Now is the time to get your plant into the "efficient" class.

The power plant of the factory has been neglected

largely because even when run with a tremendous waste of coal the cost of that coal constituted an extremely small portion of the total cost of production of the commodity manufactured, often less than 1 per cent. Hence, managers have neglected their power problems and have concentrated their attention on the more costly items of production, such as labor, material and machinery, and in these departments they have effected great economies by the application of scientific analysis and reform.

It is now imperative that they immediately shoulder the task of bringing their power, light and heating equipment and operation up to the highest plane of efficiency made possible by the best engineering practice.

Two considerations, that is, two factors, govern the efficiency of any process. These two factors are excellence of "equipment" and of "operation," and the resultant efficiency is equal to their product.

The efficiency of a steam plant is the product of the efficiency of its physical equipment, and this of the methods by which it is run. Thus you may have a good boiler and furnace, but if the fireman doesn't operate them properly your coal will be burned wastefully; you will obtain less steam than you are entitled to for the coal consumed, and the efficiency of the combination of equipment and operation will be low. On the other hand, it is possible to obtain a big saving by good handling of mediocre apparatus.

EFFICIENT FIRING MEANS GREATER STEAM PRODUCTION

For example, in one plant investigated the steam production was increased 50 per cent. with the same amount of coal. Not a dollar was spent to improve the equipment, but the fireman was taught how to operate his furnace efficiently. As soon as he learned the new method of firing his pay was increased so that he was given the necessary incentive to continue the improved performance. A simple accounting system was installed so that at the end of each day both the fireman and the manager knew how many pounds of steam had been produced for each pound of coal. This figure which had been six, now became nine, so that one-third less coal was used than formerly. This meant good money in the pocket of the factory owner.

The above plant is typical of hundreds, and similar economies can be effected all over the country. This example is quoted to show how immediate savings can be made without delay for improved power equipment.

It will be necessary, ultimately, to tackle both ends of the situation, that is, both the equipment and the operation of industrial plants. But there is a right way to start the work, and this right way is first of all to get the highest efficiency obtainable from the present existing furnace, boiler and engine equipment. This means learning how to operate the present plants so that the saving of some 50,000,000 tons of coal per year may go into immediate effect.

The first thing for every plant owner to do is to ascertain how many pounds of water are being evaporated per pound of coal. In 99 plants out of 100 this information is not at present available. It will therefore be the specific business of the plant owner to make it available. This entails accurate measurements of coal and water. There are a number of good and sufficiently accurate devices on the market for accomplishing these objects. Continuous records of the feed water and a system of observing the furnace combustion by means of flue gas analysis should be employed. Primarily flue gas analysis indicates the quality of the combustion taking place. If the combustion is faulty, it should be corrected. The services of a chemist are not required. Any person of average intelligence can operate the hand machines, and there are automatic analyzers on the market, some of which give a continuous record of furnace performance. Fuel engineers are thoroughly familiar with the various types of apparatus, for this purpose, and if necessary their advice should be obtained. In every plant, the water fed to the boiler can, and should be, measured continuously and accurately. There are no excusable exceptions to this rule. When the owner has ascertained the number of pounds of water made into steam per pound of coal, his next duty is to find out whether this is the best that can be done with his equipment and if not, how the result can be improved.

If an owner wishes his equipment to be classed as an efficient plant, so that he may receive the preference in coal delivery if shutting down of bad plants becomes necessary, then let him find out from the best sources of information how to test his boilers and make them more efficient.

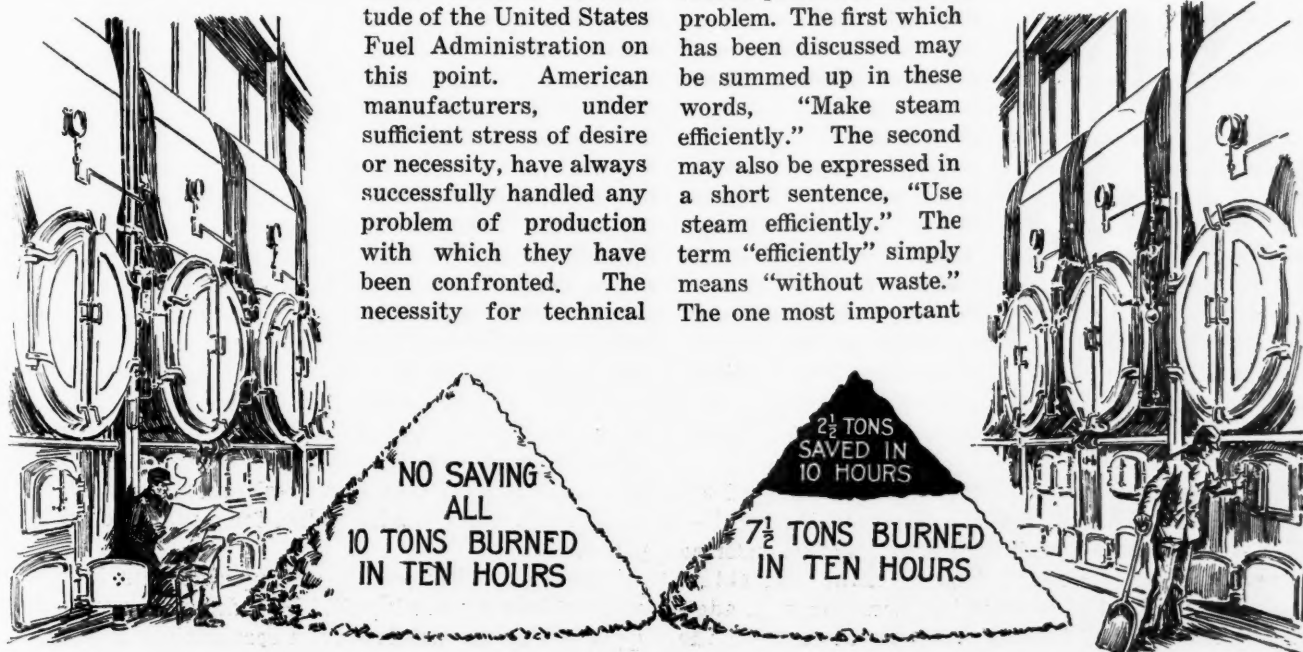
Plant owners should at once call in the best authorities on steam and fuel economies. The large savings that will be accomplished by following the advice of truly competent fuel engineers will put additional income into the pockets of the plant owners. Experience has shown that this practice always brings profitable results. Ignorance of fuel economy requirements cannot be considered as an excuse at this critical time. That is the attitude of the United States Fuel Administration on this point. American manufacturers, under sufficient stress of desire or necessity, have always successfully handled any problem of production with which they have been confronted. The necessity for technical

knowledge, almost always involved, has not stopped them. They not only have weeded out the requisite knowledge from its sources but what really counted was their ability to apply it effectively to produce results. The present problem is no more difficult or complex than those which have gone before.

The illustration below shows graphically the saving that can frequently be made by the ordinary fireman in a single day of ten hours if he uses the correct methods of handling his boiler and furnace. Thus one fireman can save 750 tons of coal in a year for Uncle Sam. Some can save more. But that is not all. The plant owner receives ordinarily the full benefit of the saving the fireman makes by virtue of his skill and faithfulness. In the above instance, one fireman might earn for his employer $\$750 \times 5 = \3750 a year in coal saved. It is only fair to divide these profits with the fireman. Furthermore, a fireman being human will probably lose his interest and the employer his profits unless a fair division of these profits are accorded to the man upon whose direct efforts the saving depends. Firemen's bonus systems have been developed to meet this situation.

A power plant is a factory. Its output is power, heat and light, and like any other factory it should be so designed and operated as to give the maximum of these commodities for a minimum expenditure of raw material, which in most cases, is coal. These conditions call for a thorough investigation of the entire plant to determine the location and extent of all preventable waste of steam and fuel. And then, when all the indicated corrections are accomplished the power plant, like any factory, must be put under a daily system of accounting and supervision to insure the maintenance of its efficient performance.

This is nothing more than common sense. Yet not one power plant in a hundred can render a true account of the production obtained from the coal consumed. Neither do the owners know how much, in terms of steam, power, heat and light should be produced for each pound of coal properly used. Yet this knowledge is available to those who seek it. Now comes the second phase of the fuel problem. The first which has been discussed may be summed up in these words, "Make steam efficiently." The second may also be expressed in a short sentence, "Use steam efficiently." The term "efficiently" simply means "without waste." The one most important



factor on this side of the factory problem is the utilization of the exhaust steam. After passing through an engine, although the pressure of the steam is reduced, it still contains 88 to 97 per cent. of its original heat.

Hence, all exhaust steam possible should be utilized in order to prevent a tremendous waste of fuel. If conditions are such that all of the exhaust cannot be used then install more efficient engines, or turbines, to reduce the production of exhaust to a point where it will just supply the demands for heating and process work. Never blow away exhaust steam to the atmosphere. This is of the utmost importance. Millions of tons of coal are being wasted in clouds of exhaust steam. Conversely, never use live steam for heating when exhaust steam can be employed.

MORE HORSEPOWER WITH SAME COAL CONSUMPTION

Let me give you an example of the failure of a factory plant "to observe these laws." One hundred and twenty boiler horsepower of live steam was being used for heating and process work while the company was buying electric power to run its machinery. Upon the recommendation of the consulting engineer, who was called in to investigate and report on the conditions of steam and fuel economy, a Corliss engine driving an electric generator was installed. The steam from the boilers now went to the engine, the exhaust from which was sufficient for all heating requirements. Enough power was produced by the engine entirely to displace the formerly purchased electric energy. All direct steam from the boilers was cut off from the heating system. Thus an additional 100 electrical horsepower was generated purely as a byproduct of the heating system, and the coal consumption remained the same as when this amount of electric current had to be purchased in addition to the coal for heating.

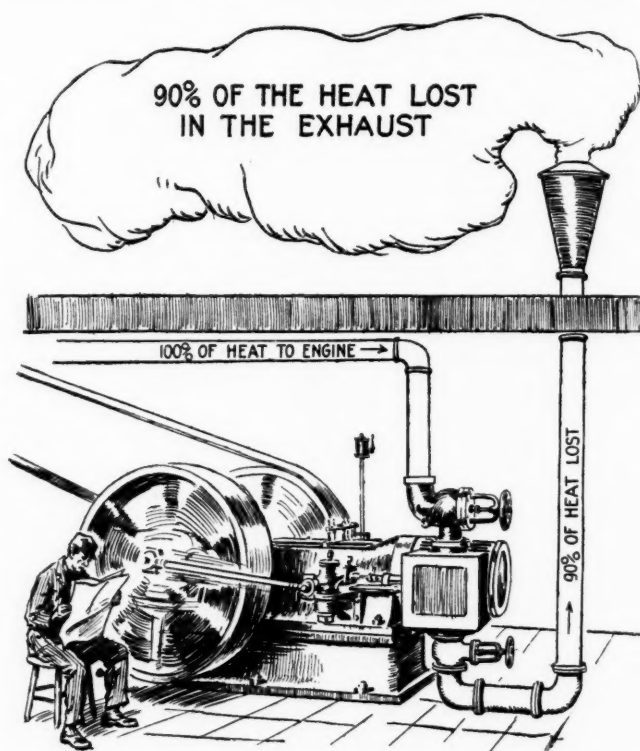
Conversely, the exhaust steam from an engine will furnish heating steam not only for its own building, but may have enough to supply several surrounding buildings. There has been developed a system known as "block-heating," whereby one central power plant, economically and efficiently operated, supplies steam heat to entire blocks of city business buildings, thereby doing away with a number of small wasteful boilers and their necessary multiple attendance. The exhaust steam is transmitted through carefully covered piping, and the heat loss in transit is practically negligible. Such a system is obviously advantageous.

In some small plants where a large waste of exhaust prevails, and where conditions do not permit its utilization, coal will usually be saved by electric power from a public service or water power company. Public service companies can perform a great service to the country, if they will coöperate with private plant owners, and make special rates for electric current, so that the small plant owner can afford to buy electric current, particularly during the non-heating season, and in many cases at night. This can usually be done to the advantage of the public service company.

The steam-using public must learn the value of exhaust steam, and that a heating system which requires 100 b.-hp. of steam may have a steam engine inserted between the boiler and the heating main, and obtain nearly 100 mechanical or electrical horsepower in addition to the required heating, with no increase in the

consumption of coal. In cases where this can be done continuously no central power station can compete with the private plant for efficiency in the production of power, light and heat.

The amount of coal required to produce an electrical, or mechanical, horsepower-hour varies all the way from a little over 1 lb. to 8 or 10 lb. This consumption which has such a wide range of values depends upon the mechanical equipment of a plant and the skill employed in its operation. Thus, speaking first of equipment, it is true that there are certain kinds of steam pumps which use as much as 150 lb. of steam per horsepower-hour; certain engines which use as much as



60 lb. of steam per horsepower-hour, whereas it is possible by electrifying the steam pumps to reduce their steam consumption to 15 or 20 lb. per horsepower-hour, and the main power producers in the form of modern engines and turbines under favorable conditions can produce a horsepower-hour for 8 to 15 lb. of steam instead of the 60 lb. which is now consumed by many engines in actual operation.

This wide range in the steam economy of prime movers combined with a difference in coal consumption of some 25 to 50 per cent., as governed by the degree of intelligence with which boiler and engine plants are operated together with a great waste and needless production of exhaust steam, indicates roughly the enormous saving of coal which is possible in the industrial plants of the United States, if their equipment and operation is raised to standards made possible by the best known engineering practice.

This country has been wastefully and heedlessly drifting along the lines of least resistance, until all of a sudden this war crisis has called for a radical change of policy.

Previous to this period, all improvements in power plant efficiency were impelled by a desire to save money. That is why the public service corporations have better

plants than power equipment of the usual factory. Their coal cost constitutes roughly 50 to 60 per cent. of their total cost of operation, whereas this item with a factory may be less than 1 per cent. of its total cost of production.

But the new reform which is now to begin will be impelled not by the incentive of expense reduction, but by an infinitely stronger and more vital force—the force of necessity. Unless efficient equipment and efficient methods are installed, there will not be coal enough to run the industries. Make your plant efficient or shut down. That is the new, the present, aspect of the fuel problem.

Heating of Coal in Piles*

By C. M. YOUNG, E. M.

Assistant Professor of Mining Research, University of Illinois, Urbana, Ill.

Bituminous coal piled in heaps or bins frequently undergoes a process of spontaneous heating as the result of the absorption of oxygen. It seems probable that the first absorption of oxygen by coal which has not previously been exposed to the air may occur as a condensation or a combination of oxygen in some form which does not result in the production of carbon dioxide, but slow combustion soon begins. The absorption of oxygen is accompanied by an increase of temperature, and this by an increased rapidity of absorption; hence the dangerous condition proceeds from bad to worse, until the kindling point is reached, unless the process is interrupted.

A dangerous rise of temperature can be prevented by excluding oxygen, by increasing the bulk of coal in proportion to its surface exposed, or by circulating enough air to dissipate the heat produced. The storage of coal, in practice, varies from almost complete exclusion of oxygen, by storing under water, to such freedom of access as exists when the coal is stored in open piles.

Oxygen available for absorption by coal is supplied by the air in the interstices between lumps and by additional air which may enter the pile through circulation. The size of the coal largely affects both of these supplies; for if the fragments are small the spaces between them constitute a small percentage of the total volume, and little oxygen will be available unless the circulation of air brings in a fresh supply, while with large fragments the percentage is relatively large; circulation also is much easier through a pile of coarse lumps. In the case of lump coal, although a large amount of air may be present, the exposed surface is comparatively small and there is little opportunity for the absorption of oxygen to be so rapid as to cause dangerous heating. Attempts have been made to prevent heating by allowing a sufficient circulation of air to carry off the heat generated; obviously this method cannot be applied to fine sizes or mixed sizes.

When storing coal at the University of Illinois, an attempt has been made to use so much fine coal and to pack it so thoroughly as to prevent circulation of air, while also reducing the original air in the pile so as to prevent heating. This method has been fairly successful, but in some cases the piles have heated. An in-

vestigation made when a pile was opened for the removal of portions which had begun to heat indicated that heating had occurred only in those parts of the pile which contained comparatively small proportions of fine coal.

To confirm the impression given by the appearance of the pile, samples of coal were taken from the spots where heating was evident, and from neighboring regions in which there was no evidence of heating. These samples were then sized on screens ranging from 2-in. to $\frac{1}{8}$ -in. round hole, giving the following results:

Size, In.	Heated Region		Unheated Region	
	Per Cent.	Cum. Per Cent.	Per Cent.	Cum. Per Cent.
Over 2	0.0	0.0	0.0	0.0
1-2	32.6	32.6	6.3	6.3
$\frac{3}{4}$ -1	36.4	69.0	22.9	29.2
$\frac{1}{2}$ - $\frac{3}{4}$	12.2	81.2	24.8	54.0
$\frac{1}{4}$ - $\frac{1}{2}$	7.4	88.6	18.5	72.5
Below $\frac{1}{4}$	11.4	100.0	27.5	100.0
	100.0		100.0	

It appears from this examination that the portions of the pile in which fine sizes were present in large proportion did not contain sufficient oxygen to heat the coal to any noticeable extent. The close packing had also so obstructed circulation that little fresh oxygen could have been brought in even if the temperature had been raised to such an extent as to favor circulation of air.

This indicates that one comparatively safe way to store coal is to use enough of the fine sizes to occupy the space as completely as possible, and to pack the coal tightly in order that the air space may be reduced and the circulation of air restricted. Apparently the most dangerous condition exists when the coal is of such sizes as to present a large aggregate surface for absorption, and at the same time leave sufficient air space to provide the oxygen required for heating; this condition is found in a loosely packed pile of mixed sizes.

Production of Companies in Indiana County, Pennsylvania, in 1917

The following table has been compiled by Thomas S. Lowther, inspector for the twenty-fifth bituminous district, Indiana County, Pennsylvania, and gives the output in 1917 of the various producing companies in that district:

Company	Tons
Jefferson and Clearfield Coal and Iron Co.	1,717,519
Pittsburgh Gas Coal Co.	1,309,545
Russell Coal Mining Co.	495,582
Penn-Mary Coal Co.	439,020
Coal Run Mining Co.	407,701
Clearfield Bituminous Coal Corporation	339,574
Tide Coal Mining Co.	167,720
Empire Coal Mining Co.	156,383
Seneca Coal Mining Co.	152,975
Inland Coal Co.	124,836
Idamar Coal Co.	107,546
Meco Coal Co.	70,000
Pennsylvania Coal and Coke Corporation	56,981
McCombs Coal Co.	56,794
Glenside Coal Co.	38,546
Dixonville Coal Co.	36,369
Williams & Griffith	35,050
Savan Colliery Co.	34,599
Marion Center Coal Mining Co.	30,019
Clymer Brick and Fireclay Co.	12,272
Jones Coal Co.	9,086
Punxsutawney Coal Mining Co.	8,578
Eliza J. Smith & Brothers	4,875
J. H. Bicknell	4,155
Estep Brothers Coal Mining Co.	2,413
Total	5,818,138

NEW ENGLAND COAL DEALERS ASSOCIATION will hold its annual meeting Mar. 20 and 21, at the Municipal Building, Springfield, Mass. Secretary, C. R. Elder, Boston, Mass.

*Presented at the New York meeting of the American Institute of Mining Engineers, February, 1918.

Supporting the Roof in Coal Mines—III

By R. D. BROWN
Harrisburg, Ill.

SYNOPSIS—Steel roof supports are here considered. The advantages of steel supports are prominent and are noted fully. Standard designs are described and illustrated, and methods of setting them up in the mine are enlarged upon. A table summarizes the characteristic features of concrete, steel, untreated wood and treated wood when used to support top. Rules and limits for efficiency and good workmanship are specified. Concludes with discussion of cost of maintaining roadways under different conditions.

STEEL, as a substitute for wood, will often prove the most economical, when permanency is desired, for supporting mine roof. The ultimate cost of the timbered roadway will depend on the natural conditions, the relative prices of materials and the life of the installation. The ideal condition is to choose a material of sufficient durability, which shall have the same life as the roadway without a renewal; the labor cost of renewals is usually very great, due to adverse working conditions. With temporary roadways timber can probably be used to advantage, if it is obtained at a reasonable cost. If timber is treated, its life will be increased greatly and the necessity of early replacement eliminated.

In general, we may say that if the life of timbering is to be greater than ten years, then wood will be found to be more costly than steel. If properly painted and cared for, steel will last a long time; it may be taken down and reerected, but the labor cost of doing this may offset any apparent saving, due to its length of life. Knowing, therefore, the estimated life of the installation, the cost of various materials and the local natural operating conditions, the type of construction adopted

should be chosen to secure low ultimate cost. The chief advantages of steel timbering are as follows:

1. *Low Ultimate Cost*—The ultimate cost consists of first cost plus interest and maintenance. A low first cost will depend on the current price of steel at the time of installation and the natural operating conditions under which it is erected. The most potent factor is the price of steel, which may vary greatly in short periods of time. If the sets are painted before being erected, the maintenance cost will be negligible and will include nothing but periodic painting.

2. *Steel Is Not Inflammable*—The danger of a disastrous fire, such as may occur when wood is used, is practically eliminated by the use of steel. A fire which may originate in materials along the roadway, or in the coal itself, may cause complete failure of steel sets; but the probability of such an occurrence may be reduced to a minimum by intelligent supervision.

3. *The Sets Are Easily Erected*—Unskilled labor may be employed to erect the sets, on account of the simplicity of the design. Each set is an exact duplicate, therefore no time is lost in assembling.

4. *Adaptability of Design*—There need be no waste of material in designing a support for any weight, or any particular condition. Specified lengths are supplied to the manufacturer and each piece is so made that it exactly fulfills the duty for which it was designed. If the seam of coal is thin, the head room obtained by using a steel crossbar is greater than if a wooden bar is used. This may prove to be quite an advantage if the vertical clearance affects the capacity of the mine cars.

5. *Ventilation Is Not Affected*—The presence of wood in the mine will affect the purity of the air. If the timber is not treated, it will decay soon after being placed; if it is treated, the time of decay is simply deferred and in the meantime the air may be affected by the chemicals used as preservatives.

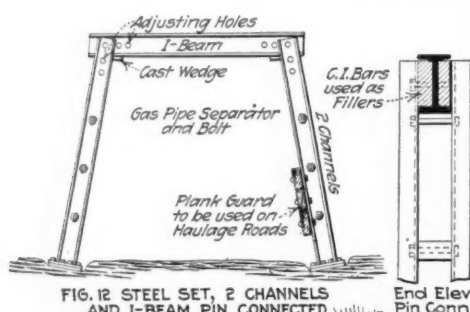


FIG. 12 STEEL SET, 2 CHANNELS AND I-BEAM PIN CONNECTED

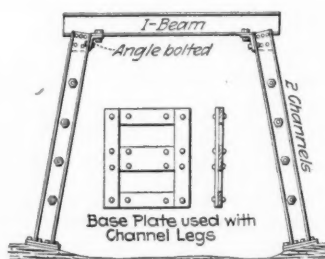


FIG. 13 STEEL SET WITH 2 CHANNELS, I-BEAM AND ANGLES RIVETED

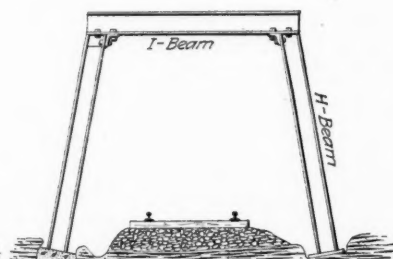


FIG. 14 3-PIECE STEEL SET, I-BEAM, 2 H-BEAM LEGS ANGLE LUGS

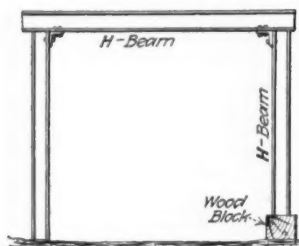


FIG. 15 3-PIECE STEEL SET, H-BEAM, 2 H-BEAM LEGS AND LUGS

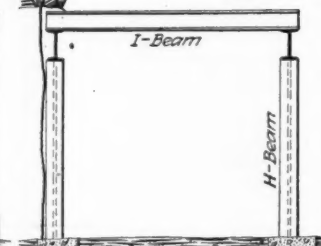


FIG. 16 I-BEAM BARS ON I-BEAMS, SUPPORTED BY H-BEAM LEGS

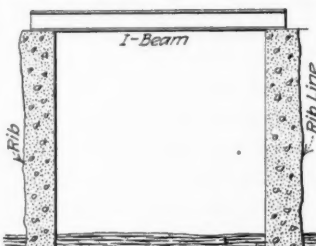


FIG. 17 I-BEAM BAR ON CONCRETE WALLS

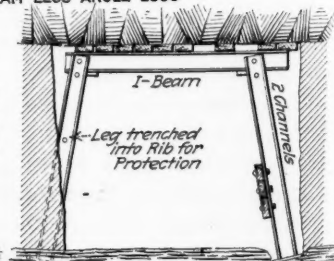


FIG. 18 STEEL SET, WOOD LAGGING

6. *Renewals Are Not Often Necessary*—The renewal of timber sets is usually a dangerous undertaking, on account of the weight of loose rock which must be supported during the operation, or else taken down before replacing the set. Only skilled labor should be used in making renewals. Steel supports may, therefore, be considered as a matter of insurance and safety.

The disadvantages of steel as roof supports are high first cost, their destructibility due to the action of mine water and their unadaptability to temporary construction. For main haulage roads, where the roof must be supported, these disadvantages are more than offset by the many advantages above enumerated; and, unless the price of the metal has increased disproportionately, steel timbering will be found to give the best results.

STANDARD DESIGNS OF STEEL TIMBERING

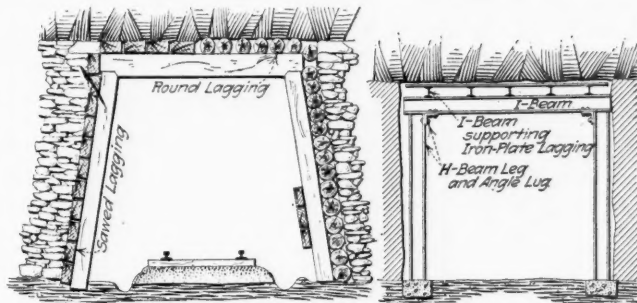
There are several standard designs for steel timbering, as shown in Figs. 12 to 17 inclusive. Each has its merits and represents good practice. Ordinarily the I-beam collar and the H-beam legs, with bolted lugs, will prove entirely satisfactory; this set is simple, easily assembled and erected, but not adjustable. If two channel sections are used for each post their effective length may be adjusted, as shown in Fig. 12. Channel posts are more expensive than H-beam posts and require a special steel baseplate. If H-beam or I-beam posts are used, baseplates are optional, depending on the nature of the bottom. The legs of a three-piece set must be protected from injury or displacement by derailed cars. This may be done by using guards, or by setting the legs back into the rib (as shown in Fig. 18). The trenched recess is practical and should be used when not too costly.

With certain conditions steel I-beams may be used as collars or crossbars without legs; they may be supported on the coal, by hitching into the rib. This cannot often be done as the coal frequently rashes under the influence of the air, thus weakening the support. If the rib will not sustain the weight, concrete or brick walls may be erected, as a permanent and safe structure, to carry any weight which might come on them in the future. The expense of such an installation will usually be in excess of that of the standard three-piece set, but it has the advantage of being more stable, fireproof and permanent.

If the roof spalls freely, a tight lagging (as shown in Fig. 19) is necessary to prevent injuries from falling slate. The moving current of air may thus be kept from immediate contact with the roof, whereby its cutting action will be reduced. When steel sets are used, steel plate lagging (as shown in Fig. 20) will prove economical where conditions relative to corrosion will permit. The thickness of the plate should be decided in each case, but it should vary between a minimum of $\frac{1}{10}$ in. to a maximum of $\frac{1}{4}$ in. The life of the lagging should be the same as the life of the set; and if wood lagging is used with steel sets, the wood should be so placed as to be removed easily.

When steel or timber sets are used, the spacing of the sets and the design of the lagging should receive due consideration. When increasing the spacing of the sets, the strength of the lagging must be increased in proportion. With ordinary weights to be supported, where lagging is required, a spacing of six feet will effect a

saving in both labor and material. If steel plate is used as lagging, a thickness greater than $\frac{1}{4}$ in. will make the cost prohibitive. A spacing of three-piece sets more than 2 ft. apart requires that longitudinal beams be placed over the collars to support the thin plates, which do not have sufficient stiffness to uphold the weight.



FIGS. 19 AND 20. DETAILS OF TIMBER AND STEEL SETS
Left—Timber Set with Tight Wood Lagging. Right—Steel Set with Steel Plate Lagging

These auxiliary longitudinal beams should be continuous over several collars to give them additional strength; they also support the weight of any loose slate if a set is accidentally removed.

The results of working out a definite problem involving various spacings are shown in Fig. 21. The conditions assumed are typical, common and within the limits of usual practice as to the weight cared for. If existing conditions differ greatly from those assumed in the chart referred to, separate calculations should be made.

Packwalls are built in longwall mines to support the roof along the haulage roads, as shown in Fig. 22. These walls are constructed of gob and mine waste, which accumulate from brushing and from falls of rock and slate. In order to build a permanent wall, the face

TABLE VIII. COMPARATIVE ADVANTAGES OF DIFFERENT MATERIALS FOR TIMBERING HAULAGE ROADS

Comparative Conditions	Material			
	Concrete	Steel	Untreated Wood	Treated Wood
Adaptability....	Can be used to suit all but most any places conditions	Adapted to all but wet places	Used universally	Not well adapted to wet places
Cost.....	First cost is great. Ultimate cost for long periods shows a saving.	First cost less than concrete. Ultimate cost long periods shows a saving.	Least first cost. Greatest ultimate cost for long periods.	Medium first cost. Ultimate cost shows a saving.
Salvage value....	None	Small	None	None
Renewals.....	Permanent	Life of 15 to 20 yr.	Life 1 to 6 yr.	Life 4 to 12 yr.
Effect on ventilation.....	Aids	Does not materially affect it	Vitiates air when rotting	Affects air when first installed
Inflammability	Not inflammable	Not inflammable	Burns readily	Burns readily when creosoted. Not readily inflammable when treated with zinc chloride
Risk due to fire..	None	Fire will melt steel	Burns readily. Insurance and fire protection costly	Same as for untreated and treated timber
Risk of accidents due to derailments, etc.....	None	If legs are not trenched they must be protected by shields of some kind	Legs must be protected	Legs must be protected
Risk to men making renewals, taking down rock, etc.....	None	Renewals in only a very few cases	Risk is continuous. Only skilled workmen may be employed on wood, but the risk account of the danger	Renewals are not as frequent as with untreated wood, but the risk is about the same

should be laid up like rubble masonry thoroughly tied into the interior. The large flat pieces should be used to bond the face course to the main body of the pack, to prevent bulging when the weight comes on. The clearance between the wall and the roadway is generally specified in the mining law. In addition manholes may be constructed at frequent intervals for the safety of men using the haulage road for a traveling way.

Packwalls afford a lodging place for large quantities of dust, which may prove dangerous. It is difficult to remove this dust, and sprinkling is not effective if it is not done with a hose. Unless it is necessary to locally stow away large quantities of gob and slate, the cost of packwalls will make them impracticable. Filling areas worked out by room-and-pillar methods of mining, by flushing with sand or culm, has been practiced in the anthracite districts of Pennsylvania and in Europe. A caving roof may thus be supported. When necessary a roadway may be excavated through the filled areas, after the material has had ample time to settle. This roadway may be used to remove coal from pillars in the flushed area, or it may be maintained as a haulage-way.

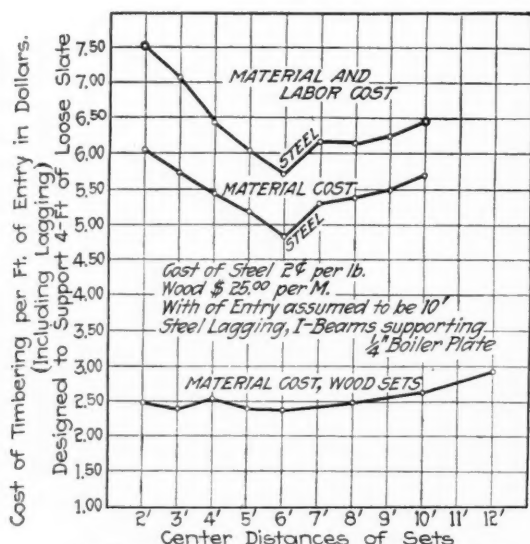


FIG. 21 CHART SHOWING COMPARATIVE COST OF DIFFERENT SPACING OF STEEL AND TIMBER SETS, 10-FT. SPAN

Cribs, or cogs, are built of layers of timber laid together much as in building a loghouse; the interior is then packed with loose rock and slate around the logs. If properly built, cribs will take great weight, but they will not prove substantial unless the gob or slate is closely packed around the timber. (See Fig. 23.) Timbering of this kind is used to support large openings or thin pillars along haulage roads, where entries cross, or at roomnecks. The crib is commonly used where the roof is strong and breaks in large slabs, instead of shelling off in small pieces. If a squeeze or a creep develops and the overburden is not great, cribs are useful to preserve a roadway; in some cases the rock movement may be arrested, or else it may be sufficiently controlled to make it possible to maintain a safe roadway.

The following rules and hints are for the benefit of timbermen who work on haulage roads:

The lives of others depend on the judgment and workmanship of the timbermen, who should at all times keep this fact in mind and be governed by it while performing their duties around the mine.

Report any dangerous condition found along the roadway to the management.

If roof is reported dangerous and must be timbered, do not work under it until it is temporarily made safe by props or other means.

When retimbering or removing weight above timber sets already in place, proceed cautiously, removing only small quantities or pieces at one time. Secure any loose rock before attempting to go further.

If timber sets are being taken out for renewal, place a temporary set and remove the old legs only after the weight has been caught.

Always select a sound piece of timber of sufficient strength.

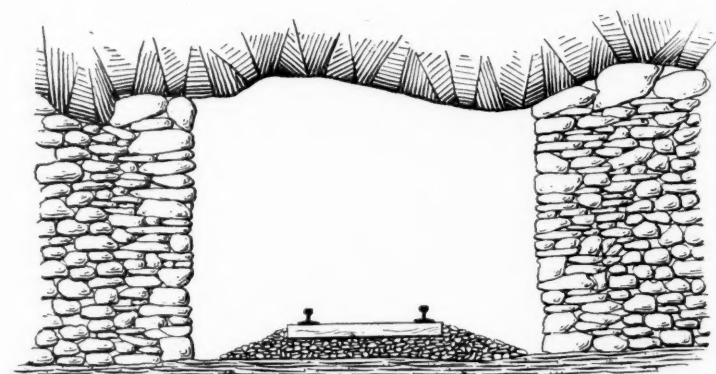


FIG. 22 PACK WALLS SUPPORTING ROOF

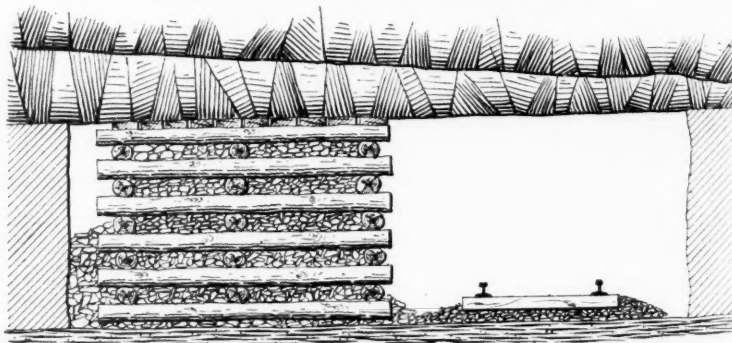


FIG. 23 TIMBER GRIB SUPPORTING LOOSE ROCK

Green timber has only approximately two-thirds the strength of seasoned timber.

Collars should be wedged tightly against the legs to hold them in place until the weight comes on the set, but never wedge the collar at the center.

If there is any side pressure, the legs of the set must be inclined to make them stable.

Inclined legs or posts of a set should be well hitched at the top and bottom to prevent displacement.

The legs of timber sets should be trenched into the rib or otherwise protected in some instances; for example, on curves on haulage roads.

Never have timber or supplies left under questionable roof or in a place where it would be necessary to go under bad roof to obtain the supplies.

All material should be delivered to the place where the work is to be done before the timbermen report for work.

Proper tools in good working order are necessary for rapid and efficient work.

Before framing, square the ends of the legs. If the legs are to be set with a batter, do not cut the squared ends until the bevel is marked off and then make one cutting suffice.

Lay off the bevel as shown in Fig. 7 by using the following formula:

$$S = \frac{(A - a)d}{2h}$$

in which S is the bevel to be marked off.

Never use a bent or crooked piece of timber to support weight.

If the piece of timber is crooked at one end, it may be squared as follows: From the center of the straight end, lay off equal distances on the other end on opposite sides of the stick. A cut through these points will square the timber.

Never work near bare live wires.

All wiring near steel timbering must be insulated.

Steel beams are easily cut by first chiseling across about $\frac{1}{2}$ in. deep, next placing the beam over two solid supports with the chiseled groove midway between, and finally shooting a small shot of dynamite directly over the cut.

All material such as wood or steel beams and posts should be ordered in proper lengths to avoid waste of both labor and material.

MAINTAINING ROADWAYS WITHOUT TIMBERING

In many cases it is unnecessary to support the roof along roadways if all loose rock is removed before it becomes dangerous; or if the roof is protected from the air by using a cement coating; or by maintaining an airway separate from the roadway, this airway to be cleaned periodically. Thus the problem of continuous maintenance may have more than one solution.

The cost of maintaining the roadway and also a separate airway will, with ordinary conditions, be from five to ten dollars per foot of entry for a twenty-year period. These figures are based on actual costs of cleaning air-courses in several mines where the roof was seriously affected. They include the cost of periodical removal of all loose and fallen rock, the cost of yardage on the additional entry driven and the construction of necessary crosscuts and also interest on all expenditures up to the end of the twenty-year period. Any disadvantage or additional power cost, caused by air-courses being choked with falls of rock or slate during early periods of operation, will be offset by the fact that later on less power will be required, due to an increase in cross-sectional area at the time most needed, when the length and the resistance of the air-course is reaching its limit.

The cost of maintaining the roadway and the air-course together will vary with different conditions, but the amount which may be spent annually in continuously protecting lives and property should not exceed a definite amount. We estimate that the least cost of effectively timbering 500 ft. of entry, 12 ft. wide, will be approximately \$6930 for a twenty-year period. The annual expenditure for the maintenance of a safe roadway, which will amount to \$6930 in twenty years with interest compounded annually at 5 per cent., is \$209.30. Therefore, if the sum to be spent annually for the main-

tenance of 500 ft. of roadway is greater than \$209.30, some form of timbering will eventually cost the least.

There is one other proposition to be considered, and that is the protection of the roof with a cement coating by the use of a cement gun. In some cases such a method of protection would be impracticable, but in others it has not only proved to be practical but also economical. A few failures have resulted from the use of too thin a coating, and it is recommended that this coating shall not be less than $\frac{3}{4}$ in. in thickness. If the cement will not stick to the roof, it may be found necessary to use metal lath secured tightly against the roof with steel pins, or supported on light I-beams. The object of the cement coating is to prevent the disintegration of the roof by exposure to the air current.

An Old Anthracite Landmark

The accompanying illustration shows one of the old anthracite landmarks near Wilkes-Barre, Penn.—the Woodward breaker of the Delaware, Lackawanna and Western R.R., Coal Department. It is located along the Susquehanna River at Kingston, about a mile west from the City of Wilkes-Barre.

Today this colliery employs about 1000 men and boys inside and around the plant, the capacity of which is 3000 tons a day of eight hours. The history of this old breaker must have been a most interesting one, the illustration suggesting many additions to the original



WOODWARD BREAKER, DELAWARE, LACKAWANNA & WESTERN R.R., COAL DEPARTMENT

building, which has spread out to accommodate the increasing demands made upon it from time to time.

This is said to be the first breaker in the Wyoming Valley to work nine hours since the eight-hour day went into effect. This is being done every day, and the men at the mine say "they are doing their bit."

The last chapter in the history of this old landmark promises to be its most interesting one, for the Woodward breaker is to be replaced by a larger one of reinforced concrete. Some of the concrete forms are in and the new breaker is to be built around the old one. The colliery officials predict that not a week's work will be lost in the reconstruction work. The new breaker is to be of concrete and steel, much of the latter material being on the ground. The capacity of the new plant will be 4000 tons a day.

Mining Engineers Consider Industrial Relations—II

BY R. DAWSON HALL
Associate Editor, "Coal Age"

SYNOPSIS—*Remarks on the New York meeting of the American Institute of Mining Engineers. The members held nine technical sessions, viewed interesting tunneling features in the subway construction and held a patriotic smoker in the Engineering Societies Building.*

AS STATED, the morning session of Feb. 18 terminated with the discussion of the paper of C. F. Wang, a paper which might have elicited extended comment had not the lunch hour intervened. The paper was more or less adequately discussed in the last issue, but one interesting feature still deserves comment. The company, the Pen-hsi-hu Coal and Iron Co., Ltd., whose operation Mr. Wang describes, increased its capital to \$7,000,000.

This \$7,000,000 plant is full of mysterious anomalies. The coke is still made by building a cone of coal, setting fire to it and shutting off the air by a covering of stone. Loading coal to the oven takes 10 men and getting stones for it five men. The covering and unloading of the coke takes 20 men and the water quenching one man.

MOUNTAIN LABORED AND BROUGHT FORTH A MOUSE

They are two to three days building the oven and 10 to 10½ days coking the coal, and when the work is done by these 36 men working 12 hours a day, there is 70 tons of coke to reward their pains and to pay for their labor and for the labor of the mine workers. From each "oven" 96 to 105 tons are obtained each month.

Work as inefficiently performed as this coke-making is bound to result in coke of a high price even where wages are low. Countries which do business in a way so uneconomical of labor are sure to pay inadequate wages. Where the product of labor is small the wage must also be small, or economic law is a fraud and a deceit.

In the afternoon a visit was made to two parts of the subway; one near Times Square where shattered rock was encountered, and the other in Brooklyn where the material to be handled was a loose running sand. The problems were pointed out by competent guides. In each case there were tall buildings adjacent which could not with safety be subjected to the most insignificant settlement.

In the Times Square section a tunnel was being excavated under an old subway. Fortunately, the supports in the upper subway terminated with broad cast-iron baseplates. In consequence it was possible to excavate narrow ways under these supports, put girders in the place excavated and then, by further excavation, provide space for brick walls. These walls when erected could, by the insertion of iron shims, be made to carry the weight without the least semblance of subsidence.

In the sand section twin tunnels had been driven by the shield method. It was purposed to connect them so as to form a station. Both tubes had to be cut. When cut neither would have enough strength to sustain the immense weight above it, for the shape would be too unstable. By careful forepoling a tunnel was driven over the top of the twin tubes. This heading was heavily timbered by 12 x 12-in. timbers. The end of the tunnel had in the main to be kept sheeted, otherwise sand in the front of the tunnel would have run into the excavation and the effect on the street and the buildings adjacent would have been disastrous.

The work was a revelation of careful tunneling where single eighths of inches in settlement counted, and where the material encountered, a beach sand, would run almost to an angle of 45 deg. to the horizontal. The upper tunnel was not completed at the time of the visit. After its completion the floor was to be gradually extracted and steel supports introduced to strengthen the tubes.

The first morning session was the annual business meeting and the new institute officers were announced: President, Sidney J. Jennings; vice presidents, Henry F. Drinker, Robert M. Raymond; directors, F. G. Cottrell, Hennen Jennings, George C. Stone, S. A. Taylor and Arthur Thatcher.

The amendment, which provided for more stringent standards of membership, passed by a vote of 1123 votes for, 59 votes opposing and 6 ballots invalid. The unanimity was not unnatural, as the requirements made were not unreasonably severe. Unless a finer screen is used than that now proposed there is no risk that any bona fide mining man will be rejected.

COARSE SCREEN AND BYPASS LETS THEM ALL IN

A member must be at least 27 years of age. He must have had six years of employment, graduation at a college being accounted as equivalent to two years of employment. For three years during that time he must have occupied a position of responsibility.

But though these restrictions are not severe a number of loopholes have been provided. Employment as a teacher is allowed to count as a position of responsibility in mining work, even though mining be not taught, but engineering, geology, metallurgy or chemistry. Moreover research work and scientific literary work is placed with teaching as a post of responsibility. Finally those who have done notable experimental work in mining, geology and metallurgy can be admitted without other qualifications. The institute is still a broad and democratic institution, open rather to talent than to mere success, and no one would wish surely to make it more exclusive.

The paper on "A New Method of Separating Materials of Different Specific Gravities" was an important event of the Tuesday morning session. This paper was read by H. M. Chance on behalf of the author, Capt.

Thomas M. Chance, who is now in the national service. Briefly, the method consists of the use of a floating medium having a specific gravity between that of the gangue and the valuable mineral. In a miniature apparatus the floating of coal from slate was demonstrated, the floating medium used being a mixture of sand and water.

With a centrifugal pump a circulation of water under small hydraulic head was maintained through a perforated plate in the bottom of the "jig" or apparatus. This made, Mr. Chance explained, a "true fluid mass" of sand and water, about 12 in. high, having a specific gravity of from 1.2 to 1.8. Above this there was about 6 in. of clear water, which was kept circulating by the centrifugal pump.

Coal and slate were put into the apparatus. The coal sank only to the level of the "fluid mass" of sand and water, while the slate sank to the bottom of the apparatus. By using heavier sands, a heavier medium may be secured. Preparations are being made to install an apparatus at one of the anthracite breakers. The work has not been carried into other fields as yet, though Mr. Chance was of the opinion that it might be applied to other separating problems upon further development. Material to be separated should be appreciably coarser than the sand used in the "fluid mass."

WITH AIR ABSENT FLOATING IS NOT FLOTATION

Discussion as to the patentability of the method brought out some humorous comment as to royalties and cost of the apparatus, J. Parke Channing adding the final quip in warning the inventor that he should be very careful not to let the least bit of air get into his centrifugal pump unless he were prepared to entertain a long lawsuit with the Minerals Separation, Ltd.

For lack of space, it is necessary to pass over the interesting sessions of the afternoon, held by the iron and steel section and the petroleum and gas section. Similarly all reference to the illustrated talk in the auditorium, on the "Devastated Districts of France," given under the auspices of the Women's Auxiliary, must be passed without comment. While the ladies went to the Metropolitan Museum of Art, Mark R. Lamb showed motion pictures of Bolivian tin mines. Later in the afternoon President-elect and Mrs. Sidney J. Jennings held a reception at their home.

In the evening a smoker with speeches, mostly serious, brought the members more closely in touch with each other. It was held in the Engineering Societies Building. Captain Hodder-Williams, of the British Army, now training prospective American officers at Columbia University, made a humorous speech, ending his remarks with an appeal for a discipline of the civilians in the rear equal to that of the army in the trenches. He said that the other Allies feared more that the men at home would weaken in their devotion and service to the nation than that the men at the front would fail to do their duty. He called on the men behind the lines to support all those measures making for an effective answer to the attacks of the enemy.

Other Allied speakers were Capt. E. E. Dulieux, representing France, and Lieut. Col. Boorman, of the British and Canadian recruiting organization, who said he hoped that if any members of the institute knew of slackers who had slipped into the country to avoid the

draft they would inform the British recruiting agencies. Samuel A. Taylor, of the technical division of the Fuel Administration, spoke at length on the purposes of the administration, commending the work of H. A. Garfield most highly and saying that no one had put the cost accounting of coal mines on a more accurate basis than R. V. Norris, who was now a part of the Fuel Administration. He put the blame for the shortage of coal on the inadequacy of the railroad rates ordered by the Interstate Commerce Commission. He also said that the country would be divided into 20 producing and 11 consuming districts and that consequently during the war coal would not be "cross-hauled."

M. L. Requa, the head of the petroleum division of the Fuel Administration, deplored the restrictions under which administrators and bureaus worked. He said that all manner of subterfuges had to be used to do those things which Congress wanted the administrations to do, but for which it had, by an oversight, not provided the needed powers of accomplishment. He said that owing to the lack of railroad transportation there were 3 bbl. of oil needed for every 2 bbl. of railroad-tank capacity available.

W. L. Honnold, of the Commission for Belgian Relief, said that a minimum requirement for the support of the people of Belgium and of the occupied portions of France had been figured out. They are only getting 60 per cent. of that minimum at present. There has been expended for the relief work nearly \$400,000,000, of which \$180,000,000 has been provided by France, \$91,000,000 by Great Britain and \$91,000,000 by the United States. The people are in terrible need of clothing, as 80 per cent. of that commodity, outside of personal apparel, has been commandeered by the Germans. Even the wool mattresses have been taken.

For clothing \$11,000,000 is needed. Only 40 per cent. of that amount has been supplied. Second-hand clothing would be most welcome. The situation daily becomes more serious, as we learn from the Spaniards and Dutch who now have the work in hand. Along the Dutch frontier still stretch three barbed wire fences 10 yd. apart, the middle one charged with electricity. The people, while they have faith in the outcome, are becoming terribly out of heart, and are suffering severely from lack of food and clothing while unable to break through the ominous line which separates them from Holland. W. G. Westervelt and W. O. Hotchkiss, of the War Minerals Committee, also gave short addresses.

(To be concluded)

On Getting Ahead

If you're not forging ahead, you're falling behind. There's no such thing in times like these as marking time or standing still. The Annual Success Number of *Coal Age*, to be issued Apr. 13, will embody the experiences of men who are moving forward. Every man in the coal-mining industry who has anything worth while to say ought to contribute a "get-ahead" article for this number—a story of success in men, material and methods. The "other fellow" will get as much inspiration and benefit from your story as you will from his. Copy, photographs and diagrams should be in our hands by Mar. 25.

News From the Capitol

By Paul Wooton



Fuel Administration Makes Clear Its Attitude Regarding Jobbers

The United States Fuel Administration has received numerous protests from consumers, as well as from jobbers and other coal dealers, against the proposed revocation of the regulation under which jobbers are now allowed to add a commission, or margin, to the prices of coal at the mines.

These protests are based upon the false assumption that the revocation of that regulation will drive the jobber out of business.

The Fuel Administration disclaims any intention to eliminate legitimate jobbers from the coal business. It has not only recognized their importance to the conduct of the trade, but has announced its intention to so fix the prices of coal at the mines as to enable the mine operators to compensate the jobbers for their services. The Fuel Administration insists that bona fide jobbers will not be forced out of business by the proposed change. They will simply be compelled to look to the operator for their compensation as they were accustomed to do before the allowance by the Fuel Administration of the margin.

In view of the protests, however, the Fuel Administration has deemed it advisable to make a more detailed statement than it has done heretofore, of the circumstances that impelled it to take the proposed action.

Prior to the entrance of the United States into the war and for nearly three months thereafter, the jobber had always bought from the operator for less than the retailer could buy direct. In other words, the price to the retailer was the same whether he bought direct from the mine, or through the jobber. The so-called jobber's margin was an innovation.

After the Fuel Administration had been organized, and the President had fixed the prices of coal, the practice of allowing the jobber to add his commission to those prices was continued.

Under the regulations issued by President Wilson, Aug. 23, 1917, a jobber is defined as "a person (or other agency) who purchases and resells coal to coal dealers or to consumers without physically handling it on, over or through his own vehicle, dock, trestle or yard."

After several months of operation under the practice of allowing the jobber to add a commission, or margin, to the price of coal at the mine, it developed that this margin was being charged and collected in many ways not contemplated by the Fuel Administration. Agencies which, while technically jobbers, were not such in fact, or were closely affiliated with the operators for whom

they acted, collected the jobber's margin, which thus became a mere increase in the profit of the operator.

One of the methods by which this profit was obtained by the operator was the practice of "swapping coal." Two operators would agree to act as jobbers for each other in the sale of their output, each collecting the jobber's margins.

Another practice was that of organizing subsidiary companies, the sole function of which was to act as the ostensible jobbers of the producing companies by which they were owned, and to collect the commission allowed by the Fuel Administration.

The effect of these practices was to add from 15 to 30c. a ton to the cost of coal to the consumer for services that were merely fictitious, and to give operators indulging in such practices a greater profit than that obtained by those of their competitors who employed bona fide jobbers. The business of the bona fide jobber suffered materially by reason of these practices.

Officials of the Fuel Administration felt that a continuance of the commission allowance to jobbers would be tantamount to a tacit consent to the operation of these fictitious jobbers. Effective supervision of the business of individual operators and jobbers, and investigation of their relations could not be undertaken by the Fuel Administration because of the expense and the amount of labor that would have been entailed.

After a thorough investigation of every phase of the situation, which included conferences with representatives of every branch of the coal business, the Fuel Administration decided that the only solution was to recommend to the President the revocation of the regulation allowing the commission or margin to the jobber, and as a substitute the fixing of prices of coal at the mine that will enable the operator to compensate the bona fide jobber for his services.

Engineering Department Hopes To Effect Fuel Economies

Acting on the belief that no other such opportunity to teach conservation of fuel ever has been presented, the Fuel Administration has established an engineering department which hopes to effect during the coming coal year economies which will save 50,000,000 tons of coal. The new engineering department is in charge of David Moffat Myers. A specialist in railway fuel will have charge of a campaign for coal economy on the railroads. Another specialist will direct work looking to economies in the industries. A third specialist will have charge of

a plan looking to the consolidation of steam and hydro-electric plants. More intelligent firing methods in the homes will be urged in coöperation with the Bureau of Mines.

The organization of the engineering department will be extended into each state. A fuel engineer is being recommended in each state. It is hoped to make this position a permanent one, so that fuel economy may be continued after the war.

Since the railroads and the industries use two-thirds of the coal produced in the United States, the most active efforts looking to conservation will be in that field. Having the power to favor plants which use their coal efficiently, the Fuel Administration has a tremendous leverage that will help toward securing compliance with its desires. As limitation of fuel probably will be necessary, plants with a high percentage of waste will be the more severe sufferers.

An order to become effective Apr. 1 will provide for sworn statements from consumers as to the amount of coal on hand, the amount ordered from dealers, the total amount used during 1917 and the amount necessary to meet the requirements of the coal year of 1918. The Fuel Administration has practically decided that such a course is necessary to insure equitable distribution.

Conference on Railroad Fuel Supply

A general conference on questions arising in connection with the supply of fuel coal to railroads was called by the United States Fuel Administration on Mar. 1. Representatives of coal-mine operators, eastern railroads, the office of the Director General of Railroads and the Fuel Administration attended.

The conference selected W. K. Fields, president of the National Coal Association, as chairman and began a general discussion of recommendations to the Director General of Railroads and the Fuel Administration designed to secure the following results: (1) To provide a definite and dependable supply of good fuel for the railroads. (2) To avoid excessive use of transportation in obtaining railroad fuel. (3) To retain for other uses some coals of special quality which are now being used as railroad fuel coal. (4) To so distribute railroad fuel in connection with all other distribution as to obtain as nearly equal running time for all mines.

The matter of the distribution of coal cars to the mines was the subject of extended discussion, some of the operators contending that there should be no preferential allotment of cars, but that all the mines should share equally.

A committee was named consisting of one member from each of the railroads represented in the conference and one member representing each of the coal districts present, which should consider the questions they had been called to discuss and report its recommendations to the conference.

The railroads appointed the following committeemen: Delaware & Hudson, J. White Spray; New York Central, S. B. Wright; Erie, W. R. Collins; New York, Ontario & Western, Charles A. Draper; Norfolk & Western, George Dungleison, Jr.; Lehigh Valley, F. L. Blendinger; Bangor & Aroostook and Boston & Maine, Frank C. Wright; Pennsylvania and Long Island, C. M. Sheaffer; Delaware, Lackawanna & Western, C. C. Hub-

bell; Canadian Northern, H. T. Rawlings; Central Railroad of New Jersey, J. F. Hinterleiter; Chesapeake & Ohio, D. T. Jellison; Baltimore & Ohio, W. L. Robinson; New York, New Haven & Hartford, George G. Yeomans; Philadelphia & Reading, E. B. Crosley.

The West Virginia coal districts named the following committeemen: Fairmont, C. H. Jenkins; Clarksburg, V. E. Goeke; Coal & Coke, R. B. Isner; Preston County, E. H. Gilbert; Scott's Run, S. D. Brady; Maryland, F. W. Wilchire; Irwin and Guyan, S. P. Hutchinson; Kanawha, W. M. Puckett; K. & M., Robert Buka; Smokeless, T. F. Farrell; Thacker, Keyser Hood.

Pennsylvania coal districts named the following: Mr. Field, chairman exofficio; Conemaugh, T. L. Eyre; New York Central, T. H. Watkins; Cambria, C. H. Jacobs; Reynoldsville, J. W. Trounce; Tyrone and Clearfield, Charles A. Owens; Somerset, Edward B. Chase; Broad Top, C. J. Langdon; Greensburg and Latrobe, W. G. Ireland; Irwin, S. B. Hutchinson; Somerset (Baltimore & Ohio), T. W. Guthrie; Pittsburgh, J. P. Walsh.

Weekly Production Statistics

Bituminous coal production decreased sharply during the week ended Feb. 23. Total production was 10,612,000 tons, as compared with 11,122,000 tons during the week preceding. Production of beehive coke increased to 568,000 tons. Anthracite shipments declined 10 per cent. Total forwardings were 36,612 cars. Production of byproduct coke totalled 403,296 tons, as compared with 381,972 tons during the week ended Feb. 16.

New Prices in Tug River Field

Forty cents has been added to the President's schedule of prices in the Tug River field. The new prices therefore are: Run-of-mine, \$2.40; prepared sizes, \$2.65; slack or screenings, \$2.15. Fifty cents has been added to the old price in the Upper Clinch Valley district, making the prices there as follows: Run-of-mine, \$2.50; prepared sizes, \$2.75; slack or screenings, \$2.25. Forty-five cents may be added to these prices by all operators who will comply with the Washington wage agreement.

Plan for Cheaper Domestic Fuel

What the Smithsonian Institution describes as a "practicable means whereby the householder eventually may obtain his domestic fuel supply at a fraction of what he now pays," is outlined in a report by Chester G. Gilbert and Joseph E. Pogue.

The gist of the plan lies in the fact that bituminous coal, instead of furnishing heat alone, can be made to yield five products—artificial anthracite, gas, ammonia, benzol and coal-tar—all of commercial value. It is proposed that the municipal gas plant, operated as a public utility, be enlarged so as to treat all the coal used by the community, with the production of the five products mentioned. Thus by centralizing the utilization of coal and employing all of the values contained in it, such great economies can be effected as to yield a really cheap domestic fuel, the authors state.

Anthracite Distribution Plan

Although no definite announcement has been made regarding the plan considered by the special committee of the General Committee of Anthracite Operators providing for an equitable distribution of anthracite this spring and summer, it is learned that a plan has been decided upon which is to be submitted to Dr. Garfield for his approval.

The committee, it is said, has had compiled figures showing the tonnages by sizes that were shipped between Apr. 1 and the present, and that by use of the shipments made between Apr. 1, 1916, and Apr. 1, 1917, will be able to notify the various state fuel administrators just how much coal will be shipped into their respective territories during the coal year beginning Apr. 1.

The proposed plan provides that each retail dealer will be supplied with order blanks by the Fuel Administrator, and that these blanks are to be distributed to consumers to be used when placing orders. By this means it will be possible for each dealer to distribute his supply of coal equitably.

Deliveries are to be divided into units; that is, all dealers are to deliver to each of their customers a unit which is to consist of a certain number of tons—say two tons or whatever other amount has been decided upon in any community—and no further delivery is to be made to that customer until such time as each customer willing to accept it has received a unit. As soon as each customer willing to accept it has received a unit, then a second unit may be delivered to any customer desiring it. The same procedure following the delivery of the first unit follows the delivery of the second unit.

When a consumer gets six tons he will be asked to accept 85 per cent. on the orders above that amount. It is hoped that in this way there will be the best possible distribution of fuel.

The proposed plan provides, however, that where, in any community, a different plan has been adopted which will accomplish the result desired by the Government, that plan will be satisfactory to the Fuel Administration.

Persons buying from more than one dealer without the permission of the local fuel administrator will be penalized, according to the proposed plan, and dealers who deliver more coal to any one person without similar permission than is represented by 85 per cent. of the amount necessarily used by such person in the year 1916-1917 will likewise be penalized. It is provided, however, that exception is made where the requirements are less than six tons. It is also provided that carloads may only be delivered to one consumer or divided among a number with permission of the local fuel administrator.

New Single-Deck Cage Hoist Record

The State of Illinois has an enviable reputation for good work in hoisting coal in shafts. Recently a mine in this state made a record by raising 5527 tons of coal in eight hours on a single-cage hoist. On Feb. 25, 1918, the American Coal Mining Co., of Brazil, Ind., broke this record by loading 5911 tons of coal in eight hours on a single-cage hoist. The American Coal Mining Co. states that when its No. 2 plant is completed and fully developed a much better record will be made. The company will do it, too, for the slogan on its letterhead reads, "Energy, economy, efficiency."

Explosives Act Leads to Savings

Important savings of explosives are being reported to Frances S. Peabody as a result of the operation of the Explosives Act. Mr. Peabody is in charge of the administration of this act for the Bureau of Mines. The strict accounting required by the law for all explosives has led to much more careful use, with the advantages that considerable saving has been made in explosive expense and the conservation of this much needed product.

Readjustment of Coke Prices

Important readjustment of coke prices has been made as follows: Pocahontas district, \$8; Preston County, West Virginia (stations on Baltimore & Ohio R.R., Tunnelton to Grafton) and Meriden, Barbour County, \$6.75 for blast furnace and \$7.75 for selected 72-hour foundry; Indiana County, Penn., \$8, if from washed coal exclusively from the lower bench of the upper Freeport seam with ash in excess of 10 per cent. or sulphur in excess of 9 per cent. If the ash is less than 10 per cent. and the sulphur less than 9 per cent., \$8.50 may be charged; byproduct coke made at Chattanooga, run-of-oven, \$8.25; crushed coke above 1 in., \$8.75; selected foundry, \$9.25.

Brief Washington Notes

W. M. Symmes, Jr., and G. T. Hoar, New York lawyers, have been added to the staff of H. D. Nims, who is in charge of the legal division of the Fuel Administration.

"Where cannel and bituminous coal are mixed," says the Fuel Administrator in a recent order, "the maximum price for the mixture shall be the mine price for the bituminous coal in the mixture."

All coal fields in Maryland and those in Mineral, Grant and Tucker Counties, in West Virginia, have been added to the producing territory over which John C. Brydon will have jurisdiction as district representative. Mr. Brydon's territory originally was Somerset County, Pennsylvania.

Producers of bituminous coal now under contract to furnish railroad fuel coal to the New York, Ontario & Western R.R. are required to give priority to the filling of these contracts under an order issued Mar. 4, by the Federal Fuel Administration. The order is intended to provide an adequate supply of coal to this road at all times and directs that the operators under contract shall ship and distribute coal regularly each week and in so far as is practicable in regular daily quantities.

The appointment of W. H. Groverman, at Minneapolis, Minn., district representative for the bituminous and anthracite coal supply on the docks of Lake Superior and the western shore of Lake Michigan, to serve as representative of all individual dock companies, was announced Mar. 4, by United States Fuel Administrator Garfield. Mr. Groverman will facilitate the apportionment and distribution of coal and supervise the prompt and equitable allotment of emergency orders among shippers.



To the Few Miners Who Still Drink: Save Your Money for Your Boy at the Front —

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

The mine workers in the anthracite region are working along steadily. The Lehigh Valley Coal Co. has conceded the demand of its men at the Centralia colliery, at Mount Carmel, and will pay them hereafter, as demanded, for the driving of double manways to breasts.

The Lehigh Valley Coal Co. received an adverse decision from Charles P. Neil, the umpire of the conciliation board, on Feb. 25. That company at the Hazleton No. 1 colliery had steam locomotives at work and was paying the men 27.2c. per hour for this skilled work. The company decided to do away with the steam locomotives and replace them by electric, which require less skill in operation. It desired to pay the motor men 23.1c. per hour.

If there is no profit in a substitution of a type of machine requiring less care, attention and training there may be little incentive to make the change. It is the natural disposition of labor to oppose improvements unless labor gets the full benefit. However, no one can feel regretful that men getting only 27.2c. per hour are not to be replaced with men getting as little as 23.1c. per hour, for 27.2c. in these days is not any too large a wage.

ATTITUDE OF UNION MEN ON LIBERTY BREAD

Howard Heinz, the food administrator in Pennsylvania, has won over the representatives of the United Mine Workers of the Lykens Valley by his clear exposition of the necessity for the flour and bread orders of the Food Administration. He took the mine workers to a bakery and induced them to taste Liberty Bread. No wonder it looked good to them, for American war bread is a great deal more tasty than bleached-flour bread and much more nutritious.

The mine workers let Mr. Heinz know that there was no disposition to slack among them. To convince the mine workers that the food in the laboring man's dinner pail was not the only kind of food to be regulated, he took the delegates to a meeting of restaurant keepers. The mine workers are now rooting for Mr. Heinz.

In Central Pennsylvania the miners are worried that they are not to share in the increase in price, which was granted by the Fuel Administration for the purpose of relieving the necessities of the operators, and the Broad Top mine workers are opposing the reduction of wages of 10c. which they will automatically sustain Apr. 1 as the outcome of a contract into which they entered knowingly last fall. It seemed, on Mar. 5, as if there would be action taken by the convention toward a further revision of the existing contracts, though all changes are opposed by the international union, the public and the Fuel Administration as in bad faith and undesirable.

NO LONGER HARRIED WITH CAR-PUSHING PROBLEM

Apparently the pushing question is not the issue it was, and much of the expense for which an increase has been granted may have been in the elimination of the conditions at the mines which made the pushing of cars imperative and in the steady cost involved where coal is gathered from the face by men in the employment of the operating company.

W. O. Smith, on behalf of the United Mine Workers of America, is said to have visited Clay, Ky., and promised that on Mar. 1 offices would be opened by the union for the purpose of organizing the western Kentucky field and doubtless, in particular, the mines of the West Kentucky Coal Co., which is a nonunion organization. J. T. Moore, the Webster County fuel administrator, has written to State Administrator Bryan, informing him of the plans and asking for instructions.

The men who work in the No. 8-A seam of Ohio, a rider

of the Pittsburgh, or No. 8 seam, want a scale made to cover that bed because it is thinner and more difficult to work. The bed is mined in No. 5 subdistrict, in Belmont, Harrison and Jefferson Counties. The mines involved are those of the Western Coal Co., the Massillon-Belmont Coal Co., the Ohio and Wheeling Coal Co., the North Belmont Coal Co., Theodore E. Jordan, W. C. Lough and H. W. Watson, William Beynon and W. C. Rouch. President William Roy, of subdistrict No. 5, offers the following scale to the conference:

	Loader	Cutter	Total
All coal over 4 ft	0.5815	0.1125	0.6940
All coal between 3½ and 4 ft	0.6300	0.1300	0.7600
All coal between 3 and 3½ ft	0.6875	0.1500	0.8375

MICHIGAN'S MINES HAVE LABOR TROUBLES

Michigan coal mines are small and inconsequential, but Michigan with a shortage of fuel, about as bad as that in New England, cherishes its coal mines as much as if they were large. Thus it is that Fuel Administrator Prudden has been much put about because the mine at Albion, Calhoun County, Michigan, has been idle for a long time with a bitter wage dispute in progress.

Acting Warden Frensdorf, of Jackson prison, has offered the services of prisoners to keep the mine going. But this offer, which if accepted would have caused a strike in all the Michigan mines, did not appeal to the authorities. President John C. Crutchfield, of the Michigan district organization, telegraphed International President Frank P. Hayes for permission to call a state-wide strike to secure the terms of the Washington agreement with 10c. a ton added. Needless to say, this request has not been granted.

Michigan's mine workers only number 2400 men, but they are frequently disaffected. The coal of the state is not of the best, the mining of the coal involves much labor, the thickness is uncertain and the profit of operation unusually dubious. All these facts have made the lot of everyone in the industry unfortunate.

KANSAS HAS UNHORSED PRESIDENT HOWAT

We publish in another column an account of the troubles in the Kansas district. The relation is from the point of view of the operator. He believes that a new attempt is being made to evade the penalty clause. It is only fair, however, to present the point of view of the mine workers.

Four of the Jackson-Walker Coal and Mining Co.'s clerks were discharged, we are told in a communication from another source. The offense was demanding a wage increase. The weighmen and office men then unionized and demanded the reinstatement of the four men. This being refused, they demanded a \$1.40 daily increase for all their members. Alexander Howat has promised to defend their interests. It is also said that several big coal companies gave the weighmen and office men an increase in November when the miners received their increase, but that the Jackson-Walker Co. did not.

More recent information assures us that Kansas is no longer faithful to Alexander Howat. The men will not continue their strikes at his bidding. The Smith, Scott and White mines are working again, and the members of the new National Bookkeepers and Company Weighmasters Union wish that the companies who were employing them would permit them to accept the jobs they threw away. Alexander Howat is alleged to have published unveracious copies of the union agreements.

The various districts of the United Mine Workers have all made their contributions to the \$800,000 fund to give bond for the judgment in the Coronado case and to cover the court costs and other charges. Missouri is, however, an exception. D. A. Frampton, the president of that district,

claims that the Missouri district was completely ignored and not consulted and that no one pledged a contribution. The committee appointed in proper form by the biennial convention to obtain this fund invited all the district presidents and secretaries to meet with it, and the Missouri mine workers certainly have no standing at all in refusing to pay the \$10,000 requested of them. The other mine workers have without a single failure thrown into the fund the \$790,000 demanded of them.

It is reported from Alabama that H. C. Selheimer, the arbitrator between the operators and their employees, will not arbitrate in the dispute between the Tennessee Coal, Iron and Railroad Co. and the Republic Iron and Steel Co., and their employees. Mr. Selheimer's work is to interpret disputes about the contract, and there is no contract in the case of these furnace corporations.

On Feb. 27 a new union of mine workers, to be known as the Independent Union of Miners of America, was organized at a Pueblo meeting of dissentients from the United Mine Workers of America. John R. Lawson, president of the Colorado State Federation of Labor, and former president District No. 15 of the United Mine Workers of America, comprising Colorado, New Mexico and Utah, is to be president of the new union.

He hopes to make it a national organization and to dispossess the United Mine Workers of America which, he claims, by crooked election methods, prevented his reelection to the presidency of District 15. He has resigned from the Colorado State Federation of Labor. He could not hold office if he was to become an officer in an organization not affiliated with the American Federation of Labor.

The delegates to the convention demanded in a telegram that President Hayes of the United Mine Workers immediately remove President James F. Moran, the present incumbent of the presidential chair in District 15, and his right-hand man, Warren Pippin. When Hayes failed to reply, the vote for a new organization followed. At the headquarters of the United Mine Workers in Indianapolis it was said that the insurgent element was small and the new union not important.

The Drumheller mine workers in Alberta, Canada, are in bad odor with other parts of district No. 18, recently in session in Fernie, B. C. The local union of Drumheller suggested that the district as a whole demand that the coal companies supply all powder, tools, lights and washhouse lockers and pay all smithing charges. They proposed in their resolution that the director of coal operations be asked to establish a standard wage scale based on a \$6 per diem rate for underground employees and \$5 for top or outside workers. The convention turned a cold ear to all these proposals.

The delegates deplore the fact that the Drumheller local is opposing Commissioner W. H. Armstrong and has asked for his removal. On Feb. 24, they resolved unanimously that they had the "fullest confidence in his ability in filling his office of trust with honor and justice to all concerned." Prior to this the biennial convention decided that the Drumheller mine workers should be ordered by the union to return to work and representatives were sent to the Drumheller region to convey these instructions. But the Drumheller men were obdurate. An order from Premier Borden about the same time supported that sent by the union. Unfortunately some doubt was put on its authenticity, but the director of coal operations, W. H. Armstrong, declared that the order of the Premier was really authentic. The mine workers at Lovett, Alta., who went on strike Feb. 18 went back to work Feb. 22. On Feb. 28 the only idle mine workers remaining were those at the Rosedale mine, where the trouble commenced.

Clever Scheme To Burk Penalty Clause

Eight Kansas mines were down Feb. 16, with a total loss of production of 5000 tons a day. This is the largest loss of production due to strikes for two months. All of the strikes are of the same type; they are the result of activities of Alexander Howat, president of the Kansas miners, in opposition to the penalty clause of the contract. The Smith, Scott and Waite mines which closed in December, and the Packard-McWilliams-Tripp mine, shut down

last week by the miners, are inactive because of controversies that come outside the contract, the miners alleging that they are not striking but have individually resigned temporarily.

The newest development which would seem ludicrous were it not so serious, is the effort of Mr. Howat to organize the office men and the companies' weigh bosses. A so-called union has actually been organized and Mr. Howat has been elected the national president. Miners are actually now striking in several mines refusing to work in establishments which do not employ union office men and weigh bosses. The first trouble of this kind was in the mines of the Jackson-Walker Coal Co., where the pit committee demanded the employment of union office men and weigh bosses.

H. N. Taylor, zone fuel administrator, has taken this matter up with the United Mine Workers, as well as with Dr. Garfield. Representatives of the mine workers are now in Pittsburg, Kan., trying to cool this matter down.

While the purpose of Mr. Howat in organizing the office men and weigh bosses cannot be officially announced, it is obvious what the effect would be if, by any chance, the weigh bosses should be organized. The striking of one man would obviously shut down the entire mine, since the miners could not work without the presence of the checker on their output. Consequently, only one man would have to pay a penalty; and two dollars a day would be insignificant compared with the \$200 or \$300 a day that the mine workers of a mine would have to pay under the penalty clause if they struck.

Union Attitude on Clean Coal

The attitude of the United Mine Workers of America on clean coal is best exhibited by an editorial entitled "As to Dirty Coal," appearing in the *United Mine Workers' Journal*.

In every contract entered into by operators and miners in every district under the jurisdiction of the United Mine Workers of America there is a provision penalizing the loading by the miners of any impurities with the coal that could, in reason, be kept out.

The enforcement of these penalties is, as much as ever it was, in the hands of the operators. Safeguards have been placed in the contracts to protect the miners against persecution on the part of petty bosses for personal reasons, and to protect active union workers from discrimination that might be made possible through the "dirty-coal" penalty clause.

The miners have absolutely no sympathy with those who load dirty coal. They recognize in that a local menace. The quality of the coal loaded, absence of dirt and other impurities determine the desirability of their product in the markets. Their opportunity to work is, in normal times, dependent upon the comparative cleanness of the coal they produce, in a competitive and often over-stocked market.

At a time like the present the miner may recognize that any kind of coal can find a ready sale; he also recognizes that the desirability of the coal he produces now will determine its standing in the market when the country returns to normal industrial conditions.

Therefore the miner, whose home is near the mine at which he works and whose entire possessions and interests are represented by that home, does not wish for any slackening in the enforcement of the disciplinary provisions of the contracts dealing with dirty coal.

The loading of dirty coal is, if anything, more reprehensible now than ever it was; not only does it menace the reputation of the value of the product of the mine and therefore the miner's opportunity to work, but dirt in coal today, when every industry is running at high tension, means inevitably a slackening of production; trains stalled; factories hindered.

We do not ask the operators to refrain from enforcing in full the penalties provided for in the contracts for loading impurities in coal. On the contrary, we believe it is to the interest of both operators and miners that not only the miners shall be required to keep their coal as free from impurities as possible, but that the operators, through their managers, also exercise the same care to try to do their part, on top, to keep coal clean, as they found it necessary to do in the not far-distant past, when the buyers exercised discriminating choice when ordering their coal supply.

EDITORIALS

What British Labor Wants

A SUBCOMMITTEE has been appointed by the British Labor Party to write out the demands of the British workman for reforms to be put in operation after the war is over. The demands are well written. Apparently the persons chosen were not animated with any fierce class hatred. They had ever in their minds, it would seem, the greatest good for the greatest number. Couched as their program is for the most part in sober, dignified language, it would not be well to discuss it in any other mood.

After declaring that all public utilities companies should be nationally and not municipally (much less privately) owned, the manifesto proceeds as follows:

"But with railroads and the generation of electricity in the hands of the public, it would be criminal folly to leave to the present 1500 colliery companies the power of 'holding up' the coal supply. These are now all working under public control, on terms that virtually afford to their shareholders a statutory guarantee of their swollen fortunes.

"The Labor Party demands the immediate nationalization of mines, the extraction of coal and iron being worked as a public service (with a steadily increasing participation in the management, both central and local of the various grades of persons employed); the whole business of the retail distribution of household coal being undertaken, as a local public service, by the elected municipal or county councils."

To those who accept the proposition that railroads and public-service corporations be nationalized and are disposed to believe that economy and progress would accrue under national management there is no difficulty in going one step forward and advocating the nationalization of coal mines. Coal is a necessity like railroads and public-service corporations.

In Great Britain it is probably a hard matter to find a place to open a new mine. Despite all the difficulties thrown around the building of a new railroad by the British Board of Trade, the Houses of Parliament and the landlords, it seems it might be almost as easy in Great Britain to locate and build a new road as to open a colliery. That being the case, in Great Britain coal-mine operation is as much a monopoly as railroad operation. If one is to be nationalized, the nationalization of the other inevitably follows.

It is not strange then that nationalization of coal mines is advocated. Perhaps it will be useless to point out instances where the coal from government mines has not proved as cheap as that mined by private corporations. It will be equally useless to show that the mines have not been better conducted. It will be unavailing to demonstrate that the rates of pay to the employees are no higher. Nor will any good be done by showing that public employees are quite often extremely dissatisfied with the terms of their employment. People

who desire nationalization are rarely open to argument. The mine workers of central Pennsylvania assembled in Dubois in biennial session have demanded nationalization. One is confident that a little experience with it would work a ready cure. But, as has been said, argument is useless. Only those who have a disease appreciate perfect health, and till we experience nationalization of industry we cannot estimate what disadvantages it will entail.

The next clause of the manifesto runs as follows:

"And there is no reason why coal should fluctuate in price any more than railroad fares, or why the consumer should be made to pay more in winter than in summer or in one town than another."

It can readily be granted that with nationalization of coal mines the stimulation of higher prices is less needed to correct shortages of coal. The nation can and doubtless will conscript workers when it needs them. It need not pay therefore any more to get them. So why need the price of coal be raised when a larger tonnage is desired? If, however, the big demand calls for opening abnormal places where the coal is thin, contorted, disturbed, broken or unusually deep or wet, then it will be necessary to put a higher price on coal; but it will be granted readily that the price will not fluctuate as much as it does with unnationalized mines, for the price now has to rise on all coal to make the less favorable coal operable.

But the last clause, relating to uniformity of price without regard to seasons or locations, is not so easily accepted; for it would seem that nothing is more essential to the whole interests of mankind than some arrangement of price that will balance the seasonal variation in the use of coal. If the price is kept uniform, winter and summer, men will buy all their domestic coal in the winter; and to meet the demand in the cold weather huge storage facilities must be provided.

With nationalization Great Britain could manage to store large quantities of coal. If stored at the mines, the railroads and the coastwise boats would be glutted in the winter. Coal delivery by auto transport would be overworked in the towns at the same time. In the warmer months large numbers of railroad men would be idle, fleets of colliers would tie up and there would be little use for coal heavers or coal wagons. A large waste of equipment would inevitably result, and the problem of idle workers and the loss of national wealth consequent thereon would be large.

Nor is this all. Any scheme which depends on storage more or less remote from the point of use is subject to breakdowns. Not only may the equipment prove, as it has in the United States, inadequate to meet the demand, but there may be storms causing a failure of the railroads or the sinking of colliers. This would be a far greater menace here, however, than in Great Britain. Only a prudent householder with a reserve in his cellar is protected against such an event, and it seems that

only a variation in price will make men prepare against the unexpected interferences with coal transport.

But it will be argued that local storage, and not mine storage is the cure. But this does not remove the problem, it only reduces it. A glut of coal truckage every winter still has to be confronted, the coal trucking equipment is still kept idle in the summer and there is still a risk that a heavy snow will block the streets.

Moreover, the size of the coal pile would be immense. It involves too large an area to be conceded within the boundaries of any city; the possibilities of fires are too great and the cost of storage is prohibitive if the coal is to be so stocked that fires will be entirely eliminated. Of course, we assume that the coal is piled deep, as it must be in a large city; and also that it is not like anthracite or Georges Creek smithing coal, which are little subject to fire.

After all, the man who supplies storage and who does without the use of his money for months is entitled to a concession. Let those who oppose the differential be required by law to put in a cellar and buy their coal in the summer. Let them run the risk of wanting to sell the property or of having the coal stolen or the house burned, and when all is done we believe they will not think that the man is unfairly rewarded who gets the rebate and who concurrently keeps the coalheaver, the coal trucker, the railroad employee and the mine worker busy during the summer months and uses equipment that would otherwise be idle; and uses it, moreover, when it gives a maximum service.

Some Advantages of Railway Electrification

THE country is now emerging from a coal famine that was not caused by a lack of productive capacity. It is freely admitted that the mines had enough capacity to meet requirements, with more or less of a margin to spare. It was the distributive agencies, the transportation lines, whose failure to meet the extreme demands placed upon them precipitated the abnormal shortage.

This is not written with the intent of belittling the work that confronted the common carriers or of maligning their performance. In fairness be it said that the task before the railroads was Herculean. There are, however, certain limitations of duty and performance beyond which rolling stock and locomotives cannot be driven. Unfortunately, also, adverse weather conditions—that is, extreme cold—exert a decidedly depressing influence on the performance of a steam locomotive. Radiation from the boiler is of no mean consequence, while trouble is liable to result from the freezing of water both in the tender tank and in various pipes. The thermodynamic efficiency of the locomotive power plant, always low, is especially so in severe cold weather.

The electric railway locomotive wherever it has been employed exhibits characteristics in marked contrast to those of the steam-driven machine. For various reasons, extreme cold increases rather than diminishes the hauling capacity of an electric locomotive, and this, together with the reliability of the electric motor, has resulted in increased performance for the same trackage of as much as 50 per cent. over steam operation. Had this increased capacity been available to the rail-

roads during the past year or so there would have been no such congestion of freight as to demand the observance of "Heatless Monday" to untangle.

Another economic aspect of railway electrification lies in the savings of coal made possible. Where the ordinary steam locomotive will evaporate possibly 4 lb. of water per pound of coal consumed, the stationary plant will evaporate 9 to 10 lb. of water per pound of the same fuel. Furthermore, where the average locomotive will deliver one horsepower-hour to the tender drawhead for an expenditure of 30 lb. of steam, the stationary plant can deliver one horsepower-hour to the switchboard busbars for, say 15 lb. of steam; assuming that losses in transmission of energy from the busbar to the locomotive drawhead amount to 33 per cent., the consumption of steam per horsepower-hour delivered to this latter point would be equal to 20 pounds.

The savings in coal consumption which would be made possible through the electrification of American railways are thus estimated to amount to 100,000,000 tons per year. Nor is this all the saving. An increased hauling capacity would be made possible through a diminution of what might be termed the internal work of the roads. That is, railway fuel would not have to be hauled in such large quantities nor for so great distances as at present. Power plants where hydro-electric energy was not available would so far as possible be placed near the mines. Fuel would thus be transported only short distances, while high-voltage electric current would be transmitted long distances. This change would release large amounts of equipment for the movement of commercial fuel or commodities other than coal. It is estimated that at least 10 per cent. of all freight movement now consists of railroad fuel. Without increasing track or yard facilities in the least, therefore, electrification would increase the carrying capacity of the roads by a goodly fraction of this 10 per cent.

Of course, in any extensive railway-electrification project development of available water-power should not be neglected. Water-power, however, is unevenly distributed throughout the country, and it is probable that in the greater portion of the land it would be necessary to rely as now upon energy derived from coal. In the mountainous regions both East and West, doubtless large amounts of hydro-electric energy could be developed.

While the amount of coal with which Nature has blessed this country is enormous, it is by no means infinite. Up to now, so far as our land-transportation system is concerned, we have "wasted our substance in riotous living"—the amount of fuel we now burn yearly in steam-locomotive fireboxes would produce approximately three times the useful power it now does if burned under stationary boilers and its energy transmitted to the motors of electric locomotives.

Railroad electrification would therefore appear to offer the most speedy and effective means of increasing the capacity and efficiency of existing trackage and yard facilities. The results obtainable are well known, having been secured in several installations already made. It is to be hoped then that the alteration of the roads from steam to electric energy will proceed as rapidly as the necessary finances, materials and labor can be secured.

DISCUSSION BY READERS

Mining Equipment

Letter No. 1—For some time past I have been an interested reader of the Discussion and other departments of *Coal Age* and can testify to their helpfulness. It is in no spirit of criticism that I make the suggestion, however, that there are many items in which mining men are interested that are quite generally overlooked.

Take, for example, the subject of roller bearings and ball bearings for mine cars. We are fed up on information from the man who sells the equipment and furnishes us with catalogs, pamphlets, letters, costs, besides giving us the results of one or two days' tests in the mine. But let us hear from the man who actually has bought and used these bearings for one, two or three years. He is the man we want to hear from.

Those of us who may be contemplating the construction of new plants or the installation of new machinery or other equipment costing perhaps hundreds of thousands of dollars; or, it may be, considering a simple investment of a few thousand dollars in mine cars, would be glad to know the experience of others along the same lines. While projects are yet dreams, the discussion of their merits and demerits is most valuable to the prospective buyer.

WHAT PURCHASERS WANT TO KNOW

Then there is the storage-battery haulage locomotive. The words sound good but some of us have not been able, as yet, to get inside news as to their capabilities. When we inquire in regard to the haulage capacity, length of charge and cost we are told it depends on the type of battery used.

Ask the battery men and each one has the "best on the market," which same we knew before being told. It would be of greater interest to know from men who have used this equipment what work is performed, on what grade the machines can haul, and the upkeep per ton-mile.

One realizes that it is possible to take an unfair advantage of advertisers, by making comparisons of similar equipment under widely varying conditions; but the field of competition is open to all and the selection of valuable equipment, suited to one's conditions, is of prime importance to users.

The need of accurate information in respect to mining equipment, and its competing value in practice, was brought forcibly home to me recently. In our mines we are using two makes of cutting machines, one being an early type having none of the recent alleged improvements while the other was a modern, up-to-date machine. We had always supposed that the modern machine would prove to be a money-saver; but, as a matter of fact, its cost of maintenance, on a tonnage basis, was double that of the older type.

During the past two years I have been called upon to overhaul this plant and, among other improvements, I

have installed a complete cost-record system in the supply house. This system shows the cost of supplies for each machine and class of equipment; and the results, dating back a period of six months, have upset many of our preconceived ideas in regard to the relative economy of certain portions of our equipment.

The information gained by thus tabulating the cost of supplies in detail have been of untold value in guiding us in the selection of future equipment. Especially was this the case, recently, when we came to order new cutting machines. The selection of the type of machine best adapted to our particular work and conditions was determined by a careful inspection of our record and previous experiences. We now have a third type of machine that we hope will prove more economical in upkeep, as based on tonnage mined.

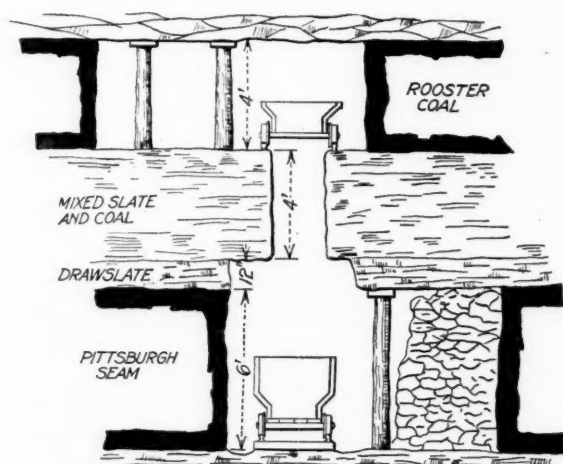
Let me say, in closing, that reviewing my own past record as mining engineer in charge of construction work, and mine superintendent in five different states, I find that experience has taught me many things; but most important of all is the fact that there is yet more and still more to be learned every day of our lives.

Noblestown, Penn.

PROGRESSIVE.

Working the "Rooster Coal"

Letter No. 2—Kindly permit me to submit my plan for extracting the rooster coal of the No. 8 Pittsburgh seam. Although the working of this seam is generally conceded to be a tough proposition, I feel sure that the



PROPOSED PLAN FOR WORKING THE ROOSTER COAL

following plan can be worked out successfully if proper care is observed in timbering the openings:

Drive all headings and airways 10 ft. wide, in both the Pittsburgh and the rooster seams, keeping the working faces in the upper seam a few yards in advance of those in the lower seam. The heading in the rooster coal, however, must not be driven directly over that in the Pittsburgh seam; but, as shown in the accompany-

ing figure, the upper heading is set over to one side, so that one rib in the upper seam corresponds to or is vertically above the center line of the heading in the lower seam.

Holes are shot in the strata separating the two seams, at intervals of 40 or 50 yd., or as found most convenient, to permit the coal mined in the upper seam to be loaded into cars running on the track in the lower seam. In the upper seam a low truck is used to transport the coal to the point where it is dumped through the hole in the floor and falls into the car standing beneath in the lower seam.

SAME PLAN ADOPTED IN DRIVING ROOMS

The same system is followed in driving the rooms as in driving the headings. The rooms are driven 20 ft. wide in both seams, keeping the working faces in the upper seam a few yards in advance of those in the lower seam. Here, also, one rib of a room in the upper seam is carried over the center line of the corresponding room in the lower seam. This system will afford a substantial roof and bottom for timbering in both seams. If desired, holes can be shot in the floor of the rooms in the upper seam, to permit of the loading of the coal mined in that seam directly into the cars standing on the room tracks in the lower seam.

All entry pillars should be made 50 ft. in width, while room pillars are 40 ft. wide. This is important, in order to afford ample support for the overlying strata and avoid the danger of a squeeze.

When the rooms are driven up a distance of say 200 ft. as a limit, the work of drawing back the pillars between the rooms must be started. The pillars in the upper seam should be brought back a little in advance of those in the lower seam, say 8 or 10 yd., which will probably be sufficient to induce a fall. Then cut into the lower pillar and split it to the face or fall, driving the place 10 ft. wide, thus leaving a stump 15 ft. wide on each side. These stumps must be drawn back together. If the line of pillar work is not kept uniformly straight much coal will be lost.

Both of the seams can be ventilated by the same air current, using the holes cut from one seam to another as crosscuts between the airways. J. H. TIPTON.

Hooversville, Penn.

Letter No. 3—The queries put by Mine Foreman, regarding the practical working of the rooster coal associated with the Pittsburgh No. 8 seam, *Coal Age*, Feb. 16, p. 349, have interested me, since I have just been handling a similar proposition.

Having had a wide experience in working coal, both on the room-and-pillar system and by longwall, I am firmly convinced that the only method that can be economically applied to the working of these seams is the longwall method of mining. Before describing the application of this method to the working of the rooster coal, let me answer briefly the four questions asked by Mine Foreman, as follows:

1. In my opinion, it is not practicable or possible to work the rooster coal in rooms 24 ft. wide and, at the same time, comply with the requirements of the Pennsylvania Mining Law:

2. Assuming that the coal has been taken out from

the Pittsburgh seam, which underlies the rooster coal and is separated from it by 4 ft. of mixed coal and slate, there is no doubt but that this loose material separating the two seams will have caved in the rooms. If that is the case it will be impossible to maintain safe conditions and properly ventilate the workings when taking down the rooster coal. The state mine law requires that there shall be a minimum of 150 cu.ft. of air, per man per min., and to maintain this circulation at the working face would be well nigh impossible under the conditions that would then prevail.

3. When it has been attempted to recover the rooster coal, in the room-and-pillar system, it has seldom happened that more than 30 per cent. of that coal has been removed.

4. The Pennsylvania mining law for the bituminous field (Art. 4, Sec. 6) requires the mine foreman to see that every working place is properly secured by posts or timbers. It is quite evident, however, that it would be impossible to comply with this requirement of the law if there was 4 ft. of loose slate lying on the floor of a room 24 ft. wide, especially when it is remembered that the roof of the rooster coal is 15 ft. above the floor of the Pittsburgh seam.

RECOMMENDS THE LONGWALL SYSTEM OF MINING

It is with some satisfaction that I recommend the use of the longwall system of mining in both of these seams, since I have proved its practicability and have succeeded in recovering 100 per cent. of the rooster coal by that method.

Briefly stated, my plan has been to develop a considerable area of the Pittsburgh seam by the longwall method and, having done this, to work out the rooster coal on the retreating system, by applying the same longwall method, starting from the faces of the abandoned roadways in the lower Pittsburgh seam.

It has been found that, in the extraction of the coal in the lower seam, the roof settlement has been so gradual and uniform and rests so solidly on the waste material separating the two seams, that there is no difficulty in extracting the coal in the upper seam and obtaining a recovery of practically 100 per cent. of that coal.

ADVANTAGES GAINED IN LONGWALL WORKING

Among the advantages offered by the longwall system of mining may be mentioned the following: (1) A constant supply of pure air, as the current travels the working face. (2) Complete control of the roof settlement, assuming that the packs have been well built in the lower seam when working that coal. (3) Concentration of haulage and a maximum output from a minimum area of workings. (4) Fewer daymen required. (5) Cleaner coal is obtained, as the slate and other waste material is thrown back in the gob, the coal being loaded on a solid bottom, instead of on the top of the mixed coal and slate. (6) No large slate hills or runways to climb, but a level bottom. (7) The recovery of, at least, 99 per cent. of the rooster coal.

In closing, let me say that when the Pittsburgh seam and the rooster coal are worked in this manner by the longwall system of mining, there is an increase of over 50 per cent. in the tonnage per acre, over the usual room-and-pillar method of working.

South Burgettstown, Penn. ANDREW O'R BAIN.

Shotfiring re Explosion

Letter No. 7—In connection with the interesting discussion on this subject, allow me to give my experience in a Cape Breton coal mine, about twenty years ago. At that time I was taking a mining course in the Scranton Correspondence Schools or the experiment I made would never have suggested itself to me, although that is not to say that the schools were responsible for leading me into dangerous practices, or causing me to violate the mining laws of Nova Scotia, which were not then, however, as rigid as they are today.

Being employed as a shotfirer, I had a large section of rooms at the top of a headway. The mine was a new one and was only down a short distance, as mines go today. The ventilation was good and, no gas having been discovered in the headway where I worked, open lights were used. The rooms were 22 ft. wide. Three shots placed one in the center and one on each side of the face were used to bring down the coal, the charge being black powder. As no crosscuts had to be driven from the toproom it naturally went ahead faster than the rooms below where crosscuts were required.

Getting off the air, my place was a little close, and I began to hear second or after reports when I fired the two side shots together, which was the common custom. As time went on and I advanced farther from the air, the after reports grew louder. I knew, or thought I knew, the cause of these second reports having often heard them before. It was the explosive mixture of gases produced by the explosives used, and fired under conditions favorable to their explosion.

A WARNING THAT WAS BUT PARTIALLY HEEDED

This was a warning to me to stop firing two shots together; but, after thinking the matter over, I decided that the danger point had not been reached and that it was an excellent opportunity to experiment under fairly safe conditions. I therefore continued firing the two shots together, until satisfied that the danger limit was near, as the after reports kept growing still louder as the room advanced and I stopped the practice, finally. Even then the last of the two shots, if fired before the fumes were allowed time to cool down, began to give a low after report, which satisfied me as to the cause of the after reports.

One day, after I had fired the middle shot the underground manager and the overman came in and, as usual, we had a social chat for some minutes. When they had gone I proceeded to fire the side shots. The force of habit being strong and without thinking what I was doing, I drew the needle from the second shot, before firing the other side. Seeing my mistake when too late and knowing that it would be dangerous to force it back in again, I decided to fire the two shots together.

Having never been in the habit of overloading my shots, I feared nothing but a loud and heavy after report. My fears were realized, for the sound and force of the after report was heard and felt far out on the lower levels. The two officials who had just visited me came running back up the headway to ascertain what had taken place. They did not find out the whole truth; but that was the last time that I fired two shots together, in the same room, and I advise all other shotfirers to stop the practice. Occasionally in the lower

rooms there were after reports very low and at irregular intervals; but these rooms were better aired and the fumes were carried away quickly.

This experience leads me to differ from former Inspector Verner as to the condition of a place where shots are to be fired. I prefer the pure air when coal is being blasted. The gases liberated from the firing of explosives, especially black powder, form an explosive mixture much to be feared where the ventilation is weak and coal dust and heat are present in the mine atmosphere.

JOHN MOFFATT.

Dominion, Cape Breton, N. S., Canada.

Surveying and Mapping

Letter No. 4—The several letters that have appeared recently in *Coal Age* relating to surveying practices have struck a responsive chord in my heart, and I am led to offer a few suggestions.

Judging from what has already been written, there is apparently a similarity in the attitude of different engineers toward the methods they employ, and the attitude of automobile owners toward their own machines. Every owner of a car swears by (sometimes at) his car as being "the best on the market." In like manner every engineer, as far as I have observed, is willing to swear that his method of surveying and tabulating notes is superior to any in use.

Referring to the claims that have been set forth in regard to the respective advantages of the continuous-numbering system for stations, in mine surveying, and the system of numbering stations so that the number will indicate the distance of the station from a starting point, it appears to me that neither of these systems can claim absolute superiority over the other.

To my mind, one of the advantages of the continuous method or system of numbering stations advocated by W. L. Owen, *Coal Age*, Dec. 8, p. 960, is that any station number can be quickly found in the notebook where they occur in regular order. On the other hand, it might be more difficult to locate a given station in the notebook where the other method of numbering is employed.

COMBINING TWO METHODS OF NUMBERING STATIONS

In my experience I have known at least one coal company to have used a partial combination of both of these systems. For example, all stations whether located in rooms, air-courses or headings were numbered in rotation as they were placed. In addition those located in headings also carry a distance number painted alongside of their rotational number.

Besides these transit stations, levels were run with a wye level, taking elevations at each 100 ft. and, occasionally, at intermediate points. These 100-ft. level stations were also painted 8 + 00, 9 + 00, etc., on the ribs. Eventually, however, the taking of distances at transit stations on the headings was discontinued, as it was found that the level distances answered all requirements in the mine or when inspecting the map in the office. I would say, however, that this method of leveling is hardly feasible in other than fairly flat coal seams.

In my opinion the most annoying and troublesome system for a stranger to encounter, in an unfamiliar.

mine, is that in which the previous survey has duplicate station numbers, as when the first station in a pair of headings is numbered 1, the next 2, etc., and the same system is duplicated in the other headings of the mine. In that case a number on the mine map contains almost no information for a stranger in the mine when attempting to extend a survey previously made. The attempt, in some cases, is a positive nightmare. I recall but one worse case, which resulted from the numbers painted on the ribs not corresponding with the numbers printed on the mine map.

In regard to plotting true rib-lines, let me say that if the management believes in developing the entire work on transit sights, it is safe to assume that, having gone to this expense, it will see that all places are driven a uniform width, and the rib-lines can then be made with a ruling pen. Where a management is indifferent in this respect, it will generally be found that they do not care for any accurate delineation of the rib-line in the rooms. A ragged looking mine will then present a ragged appearance on the map.

In closing, let me say that, in running a large survey, I prefer the continuous vernier or azimuth system, using a transit graduated from zero to 360 deg., as well as in quadrants. By taking the azimuth, quadrant and needle readings, a triple check is obtained on the survey. However, when extending a survey and projecting lines straight ahead, in an entry, the continuous-vernier system has no superiority over deflection angles.

Albert, W. Va.

J. A. SMITH.

Overlooking the Salaried Man

Letter No. 2—I was pleased to read the letter of George N. Lantz, *Coal Age*, Feb. 16, p. 344, again drawing attention to the unfair discrimination generally made in different classes of workers. Like Mr. Lantz, I read with interest the reference made to this subject some time since in *Coal Age*, and was sorry that it attracted so little attention at that time.

There is no need to dwell on the fact that the salaried employee, in any industry, occupies an unenviable position not equalled by any other class of workers. I do not refer, here, to that favored class of higher officials who have little reason to complain in respect to compensation for their time and labor.

The fact is well known to every observant person that there is a large middle class of faithful workers, who are paid small salaries that are seldom increased but remain the same, year in and year out. One is led to ask why it is that the services of this class of employees is not more generally recognized by those having power to alter their condition.

Here is a class of men, faithful and loyal to company interests and doing work that requires more or less ability and education. The failure on the part of employers to recognize, in a just and equal manner, the services of their salaried employees so that they will enjoy equal advantage, in respect to increased compensation, as the laboring classes, who compel recognition of their demands by organization, not only tends to produce dissatisfaction but destroys the efficiency of the former class of workers.

What remedy there may be for this condition remains to be seen. There appear to be two general causes to

blame for the low regard of employers for their salaried workers: (1) The education and disposition of the salaried worker makes him hesitate to urge his claim for increased compensation. Modesty and pride alike keep him from advocating his rights and needs, and for this he alone is to blame. (2) The average employer regards it as a business principle to secure the most efficient man possible, and to pay him the least sum that will retain his services.

CHANCES OF ADVANCEMENT ARE FEW

In face of these two conditions, it is easy to see that the salaried man has few chances of advancement, except as opportunity may present itself in the offer of a better position. A vacancy may occur in the company, making promotion possible; or an offer may come to him from the outside, in which case the employer, rather than lose the services of a good man will generally be willing to increase his salary.

Good business management requires maintaining the overhead charges at the lowest possible minimum, and the compensation of salaried workers comes under this head. At the same time, the employer expects faithful and loyal service, and, to the credit of the salaried employee, it can be said that he gets it from the average worker of this class.

Another factor that enters into the proposition is the strong competition between industries supplying the same market, and employers are prone to compare the services of their own officials and their rate of compensation with what competing industries are doing in the same line.

In closing, allow me to say that, notwithstanding the fact that a man's services are only worth what he can get elsewhere, no one will deny the fact that salaried men should enjoy the profits of an industry in the same proportion as the wage earner, and this should not require the organization of that class of workers to secure recognition in that respect.

KAPPA.

Ottawa, Canada.

Favoritism in Mine Management

Letter No. 3—Kindly permit me to reply to some of the statements of John Rose, *Coal Age*, Jan. 26, p. 213, who seems to think that I considered but one side of the question under discussion. I hope my letter did not convey that meaning to all readers of *Coal Age*, for it was not what I intended. My desire was to be fair to both sides, and to state only actual facts from my own observation and experience.

Referring to the suggestion that men who have been employed for a long time in a mine fall into ruts and use wasteful and expensive methods, let me say: Show me a mine where the officials have held office a number of years, and I will show you a mine that is paying the operator. On the other hand, in my experience, the mine that is constantly changing officials will generally be found to be running behind.

What Mr. Rose says in regard to a new man bringing new ideas and experiences is true; but it is my belief and opinion that, in nine cases out of ten, the company would have profited had he left those ideas and experiences where he gained them. No two mines are alike and must be studied separately.

To my mind, it should not require a new superintendent to discover whether the underofficials are keeping up to date and performing their duties in a most efficient manner. If the superintendent is worth while and equal to his job, his years of service have given him a better knowledge of the conditions existing in the mine than a new man could possibly gain for years to come.

Again, Mr. Rose quotes me as saying, "Many men do not take kindly to working under a new boss." The meaning I intended to convey was that many of the old men would fear that the new superintendent would give the best jobs and places to his own favorites whom he would bring with him. Such a fear would naturally make the old men suspicious of a new boss, until they came to know him and understand his methods.

OLD AND DISABLED MINERS

I regret to say that, in this county, there is little chance for a man to get "old on his job" in the four or five years that he ordinarily holds his place. In England, such a statement could hardly apply to men until they have been in service 20 or 30 years. But the mines in the old country, I claim, are as up to date as any of our mines in the States.

Again, in regard to "disabled miners," Mr. Rose's long experience in mines makes it unnecessary to remind him that there is much work that this class of men can do efficiently; and, while I would not object to his idea of pensioning such men instead of continuing to employ them where they could work, I believe that few companies would be willing to do this. The case mentioned in my previous letter was one where the man was not pensioned but was refused further employment.

Like Mr. Rose, I try to look at things broadly, but one cannot help seeing what is constantly occurring before his eyes. I freely admit that, as he suggests, changes in management are frequently necessary, but a change in superintendents should not mean a sweeping change in the working force employed in and around the mine.

THE COMING OF A NEW SUPERINTENDENT TO A MINE

A new man coming to take charge of a mine should study well the conditions before attempting to introduce new ideas and methods. This will take time, and, in many cases, the men must be educated to realize the advantages to be gained by adopting a new scheme with which they are more or less unfamiliar. Too often it happens that a new superintendent puts his plans into operation at once, and this gives him an excuse for placing his old men in good positions, because they are familiar with the methods he wishes to adopt.

In strong contrast with this condition, however, I have seen changes of superintendents when the old hands have been retained and their confidence won by the sincere manner in which they were treated. When a new superintendent secures the confidence of the underofficials, it is not long before he will gain, likewise, the confidence of every man in the mine, which is of the utmost importance in successful operations.

While there are exceptions, it is my belief that an old hand is frequently worth a dozen new ones. Only a few days ago I received a letter from the general manager

of the mine where I was employed, in the North of England, 15 years ago. In his letter he mentioned the names of several of the underofficials that were there when I left and are still holding their positions. It is facts like these that argue against the necessity of making sweeping changes in our mines every few years.

Heilwood, Penn.

THOMAS HOGARTH.

Examination of a Mine

Letter No. 4—For one, I could not agree with the description of the work of a fireboss given by Robert A. Marshall, *Coal Age*, Feb. 2, p. 256. Mr. Marshall states that, in Colorado, the duties of a fireboss, in his official capacity, end when he has completed his early examination of the mine, returned to the shaft bottom and entered his report in the book kept for that purpose. He is then said to turn the mine over to the mine foreman. On his return from breakfast, the fireboss reports to the foreman for instructions and, during the remainder of the day, performs whatever work may be required of him.

In my opinion, a fireboss should devote his entire time to the removal of any gases that he may have discovered on his first examination of the mine in the morning, and to otherwise making the places safe for work. To my mind, he is the proper person to do this class of work, as he understands better than anyone else the condition of the mine.

If the first examination of the mine shows no gas or other dangers to remove, the fireboss can well devote his time to the inspection of various details relating to the ventilation of the mine, such as erecting brattices where these are needed to conduct the air closer to the working face, inspecting breakthroughs to see that they are of proper size and the required distance apart, both in rooms and headings.

The fireboss is also charged with the duty of measuring the quantity of air in circulation at regular stated periods and recording this in a book kept for that purpose. These and other matters requiring attention, together with giving the needed instructions to the workmen, in regard to timbering their places and mining and blasting their coal, will fully occupy his time throughout the day.

Mr. Marshall's reference to the "Grim Reaper, who so unmercifully takes away many of our good miners," is well timed; and would appear to better advantage had he been able to set a higher standard for the fireboss' work in Colorado than that which he has described. Throughout his letter, Mr. Marshall has failed to make any reference to the responsibility that should rest on the fireboss for the examination of old abandoned workings where there is always a chance that the Grim Reaper is lurking.

To sum up, let me say that it is my candid opinion that as long as firebosses are made the goat and the importance of their work discredited, just so long will we hear of terrible catastrophes occurring in the mines. I want to repeat, here, what I have urged previously, in *Coal Age*, that the only way the death list or fatality rate in mining can be decreased is by the appointment of firebosses in all coal-mining states to act as and with the authority of assistant mine inspectors.

Poston, Ohio.

JAMES H. TAYLOR.

INQUIRIES OF GENERAL INTEREST

Haulage Problem Corrected

Kindly permit me to refer to the answer given in *Coal Age*, Feb. 23, p. 389, to the question of "Student," who asks for the distance that a boy will run, in delivering a note given him by the foreman, who was riding in the rear car of a trip 200 ft. long and told the boy to run forward and hand the note to the motorman.

In replying to this question, it was assumed that the running speeds of the trip (v_1) and the boy (v_2) are uniform and that the boy, starting from A (see accompanying figure), after delivering the note to the mo-



torman at B, immediately starts to run back and reaches the rear car just as it arrives at C, the place where the locomotive was when the boy started from A.

To the casual reader, the question appeared easily solved by arithmetic, and verified by the formula given. A little investigation, however, shows that the solution offered has only considered one condition; namely, that the time which the boy takes to run forward to the locomotive, deliver his note and return to the rear car is equal to the time that the trip advances through a distance equal to its own length. This condition is true but is not the whole story.

Allow me to suggest that the second condition is that the time which the boy consumes in running forward and reaching the locomotive at B is equal to the time that the locomotive takes to go from 1 to 2, as marked in the figure, or advances through the distance x . The first of these conditions is expressed correctly in the formula given on page 389, the time being found by dividing the distance passed through by the speed of running, in each case, which gives

$$\frac{l}{v_1} = \frac{l + 2x}{v_2} \quad (1)$$

In the second condition, the trip hauled at a speed of v_1 passes through a distance x , while the boy running at a speed of v_2 covers a distance $l + x$ in the same time, which gives

$$\frac{x}{v_1} = \frac{l + x}{v_2} \quad (2)$$

Then, dividing equation 1 by equation 2 gives

$$\frac{l}{x} = \frac{l + 2x}{l + x}; \text{ and } 2x^2 = l^2$$

$$x = \frac{l}{\sqrt{2}} = \frac{200}{\sqrt{2}} = 141.4 \text{ ft.}$$

Now, since the boy runs a total distance $l + 2x$, he runs in all $200 + 2 \times 141.4 = 482.8$ ft.

From this solution can be given the arithmetical rule, by which to solve similar questions. It is as follows:

To the length of the trip add twice the quotient obtained by dividing the length of the trip by the square

root of 2, and the result will be the distance traveled by the boy in delivering his message and returning to the rear car, in the time the trip advances a distance equal to its own length.

EDWARD HILLERY.

Matherville, Ill.

A number of letters have been received, drawing attention to the oversight in the solution to this question. It is quite evident that substituting the assumed values $l = 200$ ft., $v_1 = 8$ ft. per sec., and $v_2 = 14$ ft. per sec., in the equations 1 and 2, given by our correspondent, and which represent correctly the two conditions controlling the problem, will not give like values for x , the distance the locomotive advances while the boy is running forward. When these values are substituted in the first equation, $x = 75$ ft., while in the second equation, the same values give $x = 266$ ft., or a distance greater than the length of the trip, which is contrary to the statement of the question.

A little reflection shows that the problem is not susceptible of any simple arithmetical solution such as that first given on page 389; but must be worked out algebraically to conform to two conditions, which are as follows:

1. The first condition is that the trip advances through a distance equal to its own length l , running at a speed of v_1 , in the same time that the boy covers a distance $l + 2x$, running at a speed v_2 .

2. The second condition is that the trip advances a distance x , running at a speed v_1 , in the same time that the boy covers a distance $l + x$, running at a speed v_2 . Equations 1 and 2 express these two conditions, respectively. Then, by transposition, equations 3 and 4 are derived from equations 1 and 2, each from each and we have

$$\frac{v_2}{v_1} = \frac{l + 2x}{l} \quad (3)$$

$$\frac{v_2}{v_1} = \frac{l + x}{x} \quad (4)$$

Equating the second members of equations 3 and 4 gives

$$\frac{l + 2x}{l} = \frac{l + x}{x}; \quad 1 + \frac{2x}{l} = \frac{l}{x} + 1; \quad \frac{2x}{l} = \frac{l}{x}$$

$$2x^2 = l^2; \quad x = \frac{l}{\sqrt{2}} = 0.707l$$

The last equation shows that the distance x is a fixed decimal part of the length of the trip l , and is independent of the speed of the trip or that of the boy.

Finally, substituting this value of x in either of the two equations 3 and 4, giving the ratio of the speed of the boy to that of the trip, shows that this ratio, $v_2/v_1 = 2.414$, is fixed. Hence, in order that both conditions of the problem shall be fulfilled, the boy must run at a speed 2.414 times as great as the trip is running. In other words, assuming the trip is running at a speed of 8 ft. per sec., the speed of the boy is $2.414 \times 8 = 19.312$ ft. per sec.

EXAMINATION QUESTIONS

Indiana Firebosses' Examination, Vincennes, Jan. 17, 1918

(Answered by Request)

Ques.—(a) What is firedamp? (b) What is the lowest explosive point of firedamp? (c) What is the highest point of firedamp? (d) What is the maximum explosive point of firedamp?

Ans.—(a) Correctly speaking, the term "firedamp" should refer to any inflammable or explosive mixture of mine gas and air, although the term is commonly applied to a mixture of methane or marsh gas and air in inflammable or explosive proportions.

(b) The lower explosive limit of pure methane and air is reached when the proportion of gas to air is 1:13, the firedamp then containing 7.14 per cent. of gas.

(c) The higher explosive limit of pure methane and air is reached when the proportion of gas to air is 1:5, the firedamp then containing 16.67 per cent. of gas. The mixture still continues to be inflammable, though not explosive, until the proportion of gas to air becomes 1:2.4, and the mixture then contains 29.5 per cent. of gas. With a larger percentage of gas, the mixture is no longer inflammable.

(d) The maximum explosive point of a firedamp mixture, consisting of pure methane and air, is reached when the proportion of gas to air is 1:9.57, and the mixture then contains 9.46 per cent. of gas.

Ques.—What effect, if any, does mixing carbon dioxide with firedamp have?

Ans.—The mixing of carbon dioxide with firedamp renders it less explosive than before, carbon dioxide being an extinctive gas. Firedamp at its most explosive point is rendered in explosive by the addition of one-seventh of its volume of carbon dioxide, assuming that the firedamp is pure methane and air.

Ques.—What effect, if any, does mixing carbon monoxide with firedamp have?

Ans.—The addition of carbon monoxide (CO) to firedamp has the effect to increase its explosive condition, since carbon monoxide is an inflammable gas. In other words, it widens the explosive range of the firedamp.

Ques.—What effect, if any, does bituminous coal dust suspended in the mine air have on an explosion of firedamp?

Ans.—The presence of fine bituminous coal dust suspended in the air, and acted on by the flame of an explosion, has the effect to greatly extend the explosion and increase its force. This is due to the inflammability of the carbon monoxide (CO) distilled from the dust by the heat and flame of the explosion. An otherwise local explosion of gas is thus frequently propagated throughout the mine when fine coal dust is present.

Ques.—(a) What is afterdamp? (b) What gases are

found after an explosion of firedamp at its maximum explosive point?

Ans.—(a) The term "afterdamp" describes the variable mixture of extinctive gases that remain after an explosion of gas or dust in a mine. Although the composition of afterdamp is very variable, it consists chiefly of carbon dioxide and nitrogen, together with varying amounts of carbon monoxide and, at times, some unburned methane is present.

(b) The explosion of a firedamp mixture consisting of pure methane and air, at its maximum explosive point, produces carbon dioxide and water vapor. These gases are mixed with the nitrogen of the air remaining after the explosion.

Ques.—(a) What is a dangerous atmosphere? (b) How would you proceed to extinguish a mine fire at different stages of the fire?

Ans.—(a) A dangerous atmosphere is one that will expose workmen in the mine to danger, because of its inflammability, explosibility, or poisonous character. An atmosphere is also dangerous when it contains too small an amount of oxygen to support life and maintain a healthy condition of life.

(b) The means to be adopted for the extinction of a mine fire will depend on its location, the headway it has gained and other conditions. A gob fire, caused by the spontaneous ignition of fine coal and slack in the waste, can often be loaded out of the mine before it has gained much headway; but when such a fire has spread over a considerable area, it will often be necessary to seal off that portion of the mine workings, so as to prevent air from reaching the fire. The fire is thus permitted to smother itself.

A fire that has gained considerable headway must always be approached and fought from the intake side, in order to avoid the men being overcome by the gases produced by the fire. Before starting to fight a fire, under these conditions, all the men should be withdrawn from the mine, while steps are being taken to secure an adequate supply of water for fighting the fire. When it is evident that a live fire cannot be extinguished by the application of water, it must be sealed off by building air-tight stoppings at all entrances to that section of the mine or workings. If it is not possible to isolate a single section of the mine where the fire is located, the plan is often adopted of sealing off the mouth of the mine, for a period sufficient to extinguish the fire. As a last resort, recourse is had to flooding the mine so as to drown out the fire.

Attention has been called to a clearly evident error, in the calculation of the sectional area of the semi-circular arch forming the roof of the airway, in the reply to the sixth question on page 390, *Coal Age*, Feb. 23. That portion of the answer should read, The area of a semicircle whose diameter is 9 ft. is $\frac{1}{2} (0.7854 \times 9^2) = 31.8$ sq.ft.

COAL AND COKE NEWS

Harrisburg, Penn.

Stipulations were filed on Feb. 27 in the Dauphin County Court by the Attorney General and attorneys representing various anthracite coal companies in which it is agreed that the Locust Mountain Coal Co.'s suit to test the anthracite tax act of 1915 shall govern all the cases growing out of the act. The case is now in the Supreme Court.

A census by the police in every city and town in the state of all persons more than 50 years of age for the purpose of obtaining information for the granting of old-age pensions was proposed at a hearing of the State Commission for the consideration of Old-Age Pensions, recently appointed by Governor Brumbaugh. The census was suggested by James H. Maurer, chairman of the commission and president of the State Federation of Labor. It was also suggested that the labor unions take the census instead of the police, as then it would be more accurately and fully performed. Reports from poor directors of each county show the average cost of maintenance per capita is \$2.80 a week. It was the consensus of opinion that the monthly pensions should be \$25. The commission will report to the next Legislature.

With the state gaining revenues from the regular coal industry, the question has been raised as to the possibility of some returns being secured from the river coal industry. Attorneys and other persons familiar with state and municipal taxation are not wholly in accord on the question of title to the coal, or the right to tax. On the one hand it is held that by legislative enactment it might be possible for the state to impose a tax on the river coal industry, which at present is not being taxed. It is, of course, generally agreed that until some such law is actually enacted the industry probably cannot be made to produce any revenue to the state treasury.

As to a city or municipality's part of the taxation matter, it is asserted that possibly the only way to secure revenue from the industry would be to impose a wharfage tax or charge. River coal generally retails at from \$1.25 to \$1.75 a ton, the lower figure being the prevalent charge where there is not a long haul for delivery; but during the shortage of anthracite coal which has characterized the present winter, the cost of the river brand of coal leaped to prices above \$2. The Capitol Building, the Harrisburg Light and Power Co. and quite a number of the local industries use river coal either entirely or in part.

The Susquehanna River is dotted with coal fleets in a number of places from Pittston to Harrisburg, a distance of 130 miles. The careful attention which has been bestowed in recent months upon culm banks, once thought to be worthless, has raised another question as to the ownership of the coal which is washed down the river from the mines and gives rise to the extensive river coal industry. Attorneys say as a matter of law it would probably be true that title to the coal would remain in the concerns from whose culm banks or mines it was washed down—provided it could be traced.

But tracing the identity of the particular particles of coal which happen to be washed downstream is quite another matter and, as can easily be seen, it is a pretty safe matter to gather it from the bed of the river without any mining concern from some distant point above where it was taken from the stream endeavoring to prove the coal to be its property.

There seems to be no question but that the title to the coal rests under existing conditions in the individual or firm who first takes it.

Odd features of the compensation law were brought out at a session of the State Board during the week. The most interesting one came from the anthracite region, when it was contended that a check-docking boss is not an employee of a coal company and that injuries sustained by a

check-docking boss while lending a hand to workmen at the head of a shaft or slope do not make the company liable. Attorneys for the Lehigh & Wilkes-Barre Coal Co. argued against the decision of the referee in the appeal to the Board. The testimony showed that the check-docking boss at the Nottingham colliery had suffered a strain while assisting company hands in tipping a car of coal. The contention was raised by the company that the injuries did not result from this incident; and a second, and more unique point, was raised, when it was contended that the docking boss was not employed by the company. It was the contention of the company attorney that if assistance is given by a docking boss and injury results the company is not liable as the boss is employed by the men and occupies the same position as would a bystander who voluntarily renders assistance. The board reserved its decision.

The three companies controlling the canals that link Philadelphia with the anthracite mining regions have pledged their support in the movement which is to be sponsored by the Philadelphia Bourse, with a view of bringing about greater utilization of these waterways for coal-carrying purposes.

The Pennsylvania R. R. controls the Delaware and Raritan Canal, the Philadelphia & Reading Ry. operates the Schuylkill Canal and the Lehigh Coal & Navigation Co. controls the Lehigh Canal. It is the idea of the Bourse that if these waterways were used to their capacity for coal-carrying purposes, sufficient coal would be brought to Philadelphia during the summer to keep Philadelphia and other towns warm throughout next winter, and thus avert another famine.

PENNSYLVANIA

Pottsville—Notwithstanding numerous strikes during 1917, the Lehigh Coal & Navigation Co. increased its production 1,112,162 tons over that of the year 1916. The total production in 1917 was 4,579,571 tons.

Harrisburg—Dredges are again at work on the Susquehanna River, bringing up from the river bottom coal washed down from the anthracite fields. The "coal suckers" were laid up at the appearance of the first ice.

Pittston—Mines of the Eighth and Ninth inspection districts of Pennsylvania established new record productions for 1917, according to the reports of the inspectors, Robert Johnson and Edwin C. Curtis. The Eighth district produced 4,537,049 tons for 1917, an increase of 21 per cent., or 780,423 over the 1916 output. There was a reduction in fatalities, 168,000 tons being mined for every fatality in 1917, as compared with 124,000 per death in 1916. In the Eighth district, the output of 3,322,972 tons is 14 per cent., or 418,081 tons more than in 1916. In this district there was also a falling off in fatalities. In each district there was a slight increase in the number of employees despite the general exodus of mine workers for munition centers. The production in the Eighth district is considered a high record for an anthracite district.

North Pittston—As the result of a mine settling on Feb. 27 under the Lackawanna & Wyoming Valley R. R. bridge, traffic was blocked for several hours. The concrete walls that support the bridge and the tracks of the railroad were damaged. The bed of the tracks settled several feet and were rendered impassable. The settling is about 6 ft. deep and is due to a cave in the workings of the Heidelberg mine of the Lehigh Valley Coal Co.

Wilkes-Barre—Fire on Mar. 1 destroyed a large part of the machine repair shop of the Lehigh & Wilkes-Barre Coal Co. in the Empire yards and caused considerable damages. Although the loss amounts to thousands of dollars, a more serious aspect of the fire at this time is the fact that repairs are made at these shops for all collieries of the company in this vicinity.

Wilkes-Barre—On account of the vacancy caused by E. J. Newbaker, who left the Lehigh & Wilkes-Barre Coal Co. to become assistant general manager of the Berwind Coal Mining Co. in the bituminous

fields, C. F. Huber, president of the Lehigh company, announces the following appointments to become effective on Mar. 4: Douglas Bunting, chief engineer, appointed general superintendent; A. H. Lewis, of Jeddo, chief engineer for the G. B. Markle Co., appointed mining engineer; H. G. Davies, formerly efficiency engineer for the Delaware, Lackawanna & Western Coal Department, appointed division superintendent of the Wilkes-Barre division; J. B. Tambllyn, district engineer, appointed division superintendent of Ashley division; R. G. Carpenter, district engineer, appointed division superintendent of Plymouth division; Walter Fahringer retains his position of division superintendent of the Honey Brook division, where the official organization will be maintained without change. The positions of chief engineer and district engineer are both abolished.

Stockton—The Lehigh Valley Coal Co. is planning to reopen the mines when labor and supply conditions become normal. The Hazleton Shaft colliery adjoins the workings at Stockton. Boreholes connect the Stockton flooded workings with the shaft and are controlled by valves. Whenever the water gets too high the valves are opened and the water is allowed to flow out of the Stockton mine through the boreholes into the shaft mine, where pumps remove it to the surface. More holes will be bored and the shaft pumphouse enlarged to cope with the water that will be removed from the old workings, which contains large quantities of unmined coal that was left by the Linderman and Skeer interests when they abandoned their lease of the mine in the early '90s.

Bituminous

Smithfield—Bad roads prevented the Prospect Coal Co. from supplying coal to its ovens by its motor-truck service. A tramroad is nearly built and the coal will be delivered by cars and a small locomotive.

Indiana—Job McCreight, who holds options on 1500 acres of coal in Washington township, southeast of the village of Willett, has disposed of his options to B. M. Clarke, of Punxsutawney, purchasing agent for the Rochester & Pittsburgh Coal and Iron Co. A spur will be built from the Ridge Branch to this new field by which to get the coal to market.

Surface of half-dozen farms in Cherry Run Valley have been optioned by a Rochester & Pittsburgh Coal and Iron Co. representative. A branch will be built from the Buffalo, Rochester & Pittsburgh R.R. tracks just south of Homer City up Cherry Run to a new coal town and tipple to be erected at that point.

Somerset—George H. Hay, of Milford township, recently sold his coal operation and 40 acres of mineral lands to W. D. Dillman, of Huntingdon County, for \$10,000.

WEST VIRGINIA

Morgantown—Employees of Mine No. 1, of the Elkins Coal and Coke Co., at Richard, raised two flags and held an interesting program recently. The flags, one the Stars and Stripes, and the other a service flag with 12 stars, were raised on a 70-ft. pole. None of the men represented by the 12 stars was drafted, all volunteered.

Bluefield—The Hampton Roads Colliery Co., a new mining operation in the Pocahontas district which has recently been opened at Big Sandy, McDowell County, has started to ship coal. All sidings for the new operation have been installed and placed in service.

Huntington—The Main Island Creek mines, at Omar, Logan County, recently loaded 151 railroad cars of standard 60-ton capacity in one day. This is believed to be a new record, and shows what might be done in this field if the car supply were adequate.

The Long Fork Ry., a branch line of the Baltimore & Ohio, built on the left fork of Beaver Creek and extending to Weeksburg, opens up a rich coal deposit in the Big Sandy field. As soon as the railway begins to accept freight the Milwaukee Coke and Gas Co. will start to load with steam shovel the 250,000 tons of high grade coal it has piled up close to the tracks.

Elm Grove—The Century Coal Co. has already started work on a new operation in this vicinity. The mine will be located on what is known as the Raymond farm directly across the creek from Elmwood. T. J. McNamee and A. C. Thomas, of St. Clairsville, Ohio, are interested. The staking out of grades for switches running from the Baltimore & Ohio R.R. to the mine entrance has already been attended to, and local parties were awarded contracts for hauling and grading.

Charleston—With the completion of its tippie, the Northwestern Coal Co., which has large holdings at Horner, will be ready to begin mining coal. The Baltimore & Ohio R.R. will coal its engines at the tippie now nearing completion.

INDIANA

Fairmount—The Fairmount Mining Co. has filed a final certificate of dissolution with the Indiana secretary of state.

Sullivan—A small locomotive used in pulling cars of coal from a strip mine on the Frank Hale farm near this city jumped the track, plunged down the bank and was wrecked. The engineer, Edward Dailey, jumped as the engine left the rails and alighted in the water in the pit below. He was knocked unconscious and was almost drowned before he was rescued by mine workers. As the engine turned over in its fall, William Mills, a mine worker, jumped and fell, suffering a broken collar bone.

Bloomington—An old abandoned coal mine 10 miles southwest of Bloomington, which was worked some 35 years ago and which was reopened a month ago by George Timberlake and Richard Hall, has developed into a 42-in. vein. The coal is now being tested at Indiana University and the grade is expected to be much higher than the ordinary Indiana coal. There is an iron ore deposit near the coal mine which was successfully worked years ago, and Timberlake and Hall propose to reopen it.

ILLINOIS

Greenfield—The Greenfield Coal Co., which has been operated for several years by a group of local shareholders, has been leased to J. F. Dolan, of Springfield, for a period of one year. Dolan will pay a royalty of 20c. to the company on each ton mined. He has announced all coal will be sold cash at the mine, reversing a policy of wide credits allowed by the original company.

Carlinville—The Standard Oil Co. will sink four shafts in the vicinity of this city, according to Evan John, director of the Illinois State Department of Mines and Minerals. The company will use this coal for its plants at Wood River, Ill., Whiting, Ind., and Kansas City, Mo. Over 400 men are now employed in work preparatory to the sinking of the first shaft.

The Superior Coal Co.'s No. 3 mine here claims the distinction of being the greatest coal-producing mine in Illinois. Figures recently compiled show 1,158,796 tons of coal was mined at this operation during the 200 working days of 1917. The mine has a daily output of 4457 tons and employs 680 men.

The Standard Oil development is not the only one which is being promulgated in the Carlinville district at the present time. It is said that local interests expect to begin mine operations on a large scale, while a large railroad company is also considering entering this field. With the increased activity of the Standard Oil Co. in this territory the Chicago & Alton R. R. must enlarge its yards. The local Chicago & Alton yards have had new tracks installed to accommodate the Standard mines in Carlinville, but the main yards for the mines north of the city will be three miles north of the Carlinville station and will be located on the John C. Anderson land. The railroad company has purchased a tract from Mr. Anderson, upon which it will construct seven parallel tracks each $\frac{3}{4}$ mile in length.

Taylorville—Fire broke out recently in the third southwest section of Mine No. 8 at Tovey. The fire was brought under control the following day, but on account of the smoke in that section the men were not permitted to work in it for several days.

Mrs. Mary Ormsby, who is at present residing in California, has sold the coal rights on her farm of 328 acres just east of this city to the Peabody coal interests for \$25 an acre, or a total of \$8200. It is not known whether the Peabody interests intend to connect their field with this new mine or whether the purchase was made to break up the plan of another coal mine about to be launched and which included the farm which Mrs. Ormsby owned.

Belleville—It is reported that the St. Ellen Mining Co., of O'Fallon, was fined \$100 by Justice Beineke recently for failing to properly equip the warehouse at the mine. The evidence was that the heating and the hot and cold water system were not according to the mining law.

John Downing, a shotfirer employed in the so-called "Nigger Hollow" Mine No. 2, had an unusual and dangerous experience when the lamp upon his cap became extinguished just as two charges of explosives were about to be discharged. Downing became confused after his light failed, and realizing that he was lost threw himself upon the ground face downward. He was painfully burned and also injured by flying particles of coal and debris. He was removed to a hospital where it is thought he will recover.

Springfield—Andrew Smaller, employed in Klondike Mine No. 5, was arrested by United States deputy marshals when it was reported he had told two other miners "he'd just as soon drop a fuse into that keg of powder and blow up the mine." He professed innocence of any intent of wrongdoing, but was held for investigation. He is a native of Austria and came to this country 24 years ago at the age of 19. He was naturalized in the County Court here 14 years ago.

Four kinds of negligence are alleged in the verdict of the coroner's jury into the deaths of four men in Mine A of the Citizens' Coal Co., on the morning of Feb. 23. The verdict was that the explosion was caused by a blowout shot, that the shot was improperly placed, that the shotfirer did not properly report the shots, that the mine was not sprinkled at proper intervals and that the shots were fired while employees were still in the mine. There was also testimony at the inquest that the ventilating fans were not stopped before the shots were fired. The regular shotfirers had placed three shots in one of the rooms and had not fired them because a car was off the track in the room. The night boss and six men replaced the car and the fuses were lighted under the direction of the night boss. The bodies of the men were found several hundred yards from the room where the explosion occurred.

Benton—J. E. Jones, ex-State Mine Inspector, 11th District, states that the annual coal report of Illinois shows that Franklin County produced 11,317,657 tons with 21 mines during 1917. This would make Franklin County rank first in the production of Illinois coal for last year, and not Williamson County, as mentioned in these columns on Feb. 23.

Danville—A new transformer has been placed in the Electric mines, near Missionfield, Ill., to replace one recently destroyed by fire. The burning of the transformer threw several hundred miners in mines Nos. 1, 2, 3 and 4 of the Hartshorn interests out of employment and curtailed production 24,000 tons.

Virden—Following are the details of how the four men were killed in the Royal Collieries mine here on the morning of Feb. 22, when 28 kegs of powder exploded on the 300-ft. level: The men had lowered the powder on the cage and loaded it on a mine car. An electric motor was attached to haul it into the entry which was being worked. The wheels of the motor skidded. This formed a short-circuit and set off the powder. On account of the stacks at the mine having been blown down a few days before, the men were working half shifts day and night and few were in the mine. The coroner's jury held the mine officials responsible in that the powder had been unlawfully let down into the mine and left standing on the switch track while the power was on, and it was recommended that the company be held liable. The explanation of the manner in which electricity reached the powder is that it entered the car through the axles and the drawbar and ignited the powder through the metallic kegs. G. G. Gordon, superintendent of the mine, says that when the powder was lowered at 2:30 a.m. it was put on the entry track out of the reach of electricity.

Gillespie—The Superior Coal Co. has discontinued its coal train between Benld, Ill., and the Sangamon River, owing to recent thaws which filled the reservoirs and which also assisted in operating the coal washer which had been shut down since last December.

KENTUCKY

Madisonville—The recently organized Grapevine Coal Co. announces that it is ready to commence loading cars at once, but that the output at the start would be

small as most of the coal will come from the entries as they are driven.

Two coal companies have started a big boom at the mining town of Mannington, where 50 miners' houses are being erected. The Memphis Coal Co. is building a large commissary, while the Williams Coal Co. is planning operations on a large scale.

Hellier—It is reported that the huge plant and coal mines of the Allegheny Coke Co. have been sold to the Elkhorn Coal and Coke Co., in a deal involving an even million dollars. J. L. Morgan, superintendent of the Allegheny company's operations, has resigned to open mines of his own in the same vicinity.

Clay—The Ward Coal Co. has sold its mine here to the Boone & Boone Coal and Ice Co., of Louisville, Ky., the latter concerning announcing that it would operate as the Fairmont Mining Co. The Ward company has been operated for several years by Luke Mitchell.

Providence—Edgar M. Young and James E. Morgan have purchased the coal mine and plant of S. K. Luton, located on the Illinois Central Ry. The new owners are planning to enlarge the capacity of the mine.

IDAHO

Boise—The Teton Valley Coal Co. has been sold to Seattle and Spokane investors, according to R. N. Bell, state mine inspector and one of the principal stockholders in the original company. The purchase price is given as \$100,000. The property is the only commercial deposit of any size in the state and has a main shaft which is being driven to a depth of 500 ft. It is located near Driggs.

MONTANA

Bozeman—The Moxey Bros. at Storrs have uncovered a 10 ft. vein of coal which is believed to be the vein the Amalgamated Copper Co. abandoned after losing it several years ago. The coal is of excellent quality, a load of it having been burned by a local greenhouse with excellent results.

WASHINGTON

Bellingham—Anderson & Johnson and John C. Eden, the latter a prominent capitalist of Seattle, are opening a coal mine near here on Clayton Bay.

The Bellingham Coal and Coke Co., recently incorporated for \$150,000 by F. W. Kittle, C. M. Skelton and F. I. Gater, has leased a recently discovered coal mine on the Samish road $\frac{1}{2}$ miles south of the city and development work has been started. The coal is said to be high-grade bituminous. Mr. Kittle was for years operator of the Issaquah coal mine in this state.

Cle Elum—The Independent Coal and Coke Co. has just completed the construction of an \$8000 washhouse for the men of the local mine. The structure is said to be one of the finest in the state and has 31 shower baths.

Seattle—Dr. Bailey Willis, professor of geology of Leland Stanford Jr. University, of California, is in the state to continue work undertaken for the Carbon Hill Coal Mining Co. several years ago. For several days he has been making a study of the coal beds of King and Pierce Counties. "A very thorough investigation of the coal and iron resources of the Pacific Coast from Alaska to Mexico has been made," he states. "One of the objects has been to determine whether or not this main coast could become independent of the Eastern iron and steel manufacturers."

Spokane—Far-famed Alaska coal will undergo the severest commercial tests in Tacoma in a few days. A shipment of coke from the Alaska coal has been received, and will be tried out in the Puget Sound Iron and Steel works plant. The coke is from the coal shipped from the Chickaloon district in the Matanuska fields on the government railroad in Alaska to the Wilkeson Coal and Coke Co. for cooking in the company's big ovens at Wilkeson. This is said to be the first attempt to coke the coal on a scale sufficient to test its value for this purpose. The coking has been done by Supt. Joseph Lee of the Wilkeson Coal and Coke Co., and those who have seen the coke, and who can, pass as judges, say it is a good grade of coke and should show satisfactory results from the tests. The Alaska coal fields were examined by the United States Government in 1912. The first steaming tests were made on the battleship "Maryland," and the coal proved to be 98 per cent. as efficient as the Pocahontas coal of West Virginia.

ALASKA

Cordova—The Katalla Anthracite Coal Co. has opened its property to such an extent that as soon as the railroad now building from Controller Bay to the mine

is completed it will ship at the rate of 200 tons of coal a day. The Government engineers have pronounced the coal the equal of Pennsylvania.

The Moose Creek line of the Alaskan Engineering Commission is now shipping coal at the rate of 50 tons a day.

Joseph Jandos and George Athans, of Anchorage, have driven a 50 ft. tunnel into their coal property a mile northwest of the crossing of the Little Susitna River, exposing a vein of coal 6 ft. thick.

John Lofstrom and Eser Wikholm, of Anchorage, are also proceeding with the development of their coal property near the Jandos and Athans mine and have shipped 20 tons of coal to the Anchorage market so far.

Foreign News

Paris, France.—France mined 28,960,000 tons of coal in 1917, or 7,000,000 more than in 1915, an increase of 25 per cent. on 1916 and 45 per cent. on 1915. For the year imports declined to 18,470,000 tons, or 1,500,000 tons less than 1915.

Montreal, Can.—The International Coal and Coke Co., the mines of which are near Coleman, Alta., reports a profit of \$84,565 for 1917, as against \$48,250 for 1916. The balance at credit of profit and loss account is \$86,583. This is regarded as a satisfactory showing in view of prolonged labor troubles.

Halifax, N. S.—A verdict has been rendered by the coroner's jury on the explosion at the Allan mine, Stellarton, N. S. The jury finds that the explosion occurred on the 1200-ft. level in one or two places. They recommend that a commission of mining experts be appointed to make a careful inquiry into the working of the Pictou County coal mines.

Sydney, N. S.—An agreement has been reached between the Dominion Coal Co. and the miners in its employ on the wage basis decided on at a conference some weeks ago in which Hon. T. W. Crothers, Minister of Labor, and Senator Robertson took part. The increase of wages granted will average about 17 per cent. and will increase the expenses of the company by nearly \$1,000,000 per year. About 5000 men are affected.

Personals

Thomas L. Healy, of McRoberts, Ky., has accepted the position of superintendent of mines Nos. 1, 2 and 3 for the Main Island Creek Coal Co., at Omar, W. Va. Mr. Healy will be located at Micco.

J. Noble Snider has been appointed acting coal traffic manager of the New York Central R. R., in the absence of G. N. Snider, who has been assigned to the staff of the Fuel Administration at Washington.

W. P. Beveridge, of Beryl, W. Va., has resigned his position as mine superintendent of the Lower Potomac plant of the Davis Coal and Coke Co., to accept a similar position with a large operating company in Virginia.

Harry B. Christ, of Hazleton, Penn., chief engineer for the Dodson Coal Co. at the Beaver Brook mines, has resigned to become affiliated with the Lehigh Coal and Navigation Co. He will have headquarters at Lansford.

Merle I. Terwilliver, formerly of the mining engineer's department of the Lehigh Valley Coal Co. at Wilkes-Barre, has been appointed to the post of division engineer for the Mahanoy division of the company. He fills the post made vacant by the resignation of F. Nervain.

W. M. Chase has been appointed general superintendent of the Union Coal and Coke Co., Pittsburgh, Penn., to succeed Harry J. Meenan, now managing partner with Cosgrove & Co., Johnstown, Penn. Mr. Chase has been identified with the coal industry in central and western Pennsylvania during the past 20 years.

Garner Fletcher, who for several years has been manager of the Van Lear operations of the Consolidated Coal Co., has been promoted to the management of the company's larger operations at Jenkins, Ky. **E. R. Price**, who for several years was chief clerk at Van Lear, has been made manager at that point.

J. C. Messenger, of Beryl, W. Va., has been appointed mine superintendent of the Lower Potomac plant of the Davis Coal and Coke Co., to take the place of W. P.

Beveridge, resigned, as mentioned elsewhere in these columns. Mr. Messenger is known as a progressive and efficient man, and one who is in every way qualified for his new position.

Paul T. Norton, Jr., former division engineer of the Somerset division of the United Coal Corporation, located at Boswell, Penn., who for the past three months has been in the Signal Department of the Government at Washington, D. C., has been transferred to the Officers' Aviation Training Camp at Fort Sill, Okla. Mr. Norton's home is in Columbus, Ohio.

R. Z. Virgin, who was recently mentioned in these columns as having accepted a chair in the College of Engineering of the West Virginia University, Morgantown, W. Va., was appointed instructor in Mining Extension, with headquarters at Elkins, W. Va. The head of the Department of Mining of the University is A. C. Callen, who on Nov. 1, 1917, succeeded Professor Zern.

Joseph Sinnotte, who for a number of years was mine foreman for the North East Coal Co., at Thealka, Ky., and later with the Consolidated Coal Co., at Van Lear, Ky., has been named as general manager of the Big Hollow Coal Co., of Pike County, with headquarters at Pikeville. Mr. Sinnotte has been prominent in the Sandy Valley operations for a number of years.

Obituary

J. D. Gibson, 74 years of age, a prominent coal operator of Kentucky, recently died at his home in Pineville. The funeral services were conducted by the Odd Fellows. Mr. Gibson is survived by two sons and two daughters.

John Woolcock, of Pottsville, Penn., a coal operator in the Schuylkill region, died on Mar. 2, aged 73 years. He was born in Ireland, but came to this country at an early age and engaged in coal mining on an extensive scale. After succeeding in the mining of anthracite he developed successfully soft-coal operations in West Virginia.

William Osborn, manager and part owner of the Osborn Machine Co., Dubois, Penn., manufacturers of overwind devices, soot cleaners and mine equipment, died at Dubois, Mar. 1, of pernicious anaemia, after a sickness lasting four years. He was born at Falls Creek, Sept. 15, 1855, and opened up his foundry and machine shops in 1900.

Thomas Sprague, one of the most prominent men of the Pennsylvania anthracite region, died suddenly at his winter home in Altamonte Springs, Fla., on Mar. 1, from heart failure. Mr. Sprague came from New England to Scranton in 1886 to develop the Mt. Pleasant and Sterrick Creek coal companies. When these operations were sold in 1900 Mr. Sprague formed a partnership with Walter L. Henwood in the diamond drill business. He was 73 years of age and is survived by his widow.

Industrial News

Wheeling, W. Va.—The Richland Coal Co. has purchased the towboat "D. A. Nisbet," of Evansville, Ind., and will ship by river. A costly tippie is now being built on the river near here.

Philadelphia, Penn.—The Philadelphia & Reading Coal and Iron Co. is installing a fleet of motor ambulances at all its collieries throughout the Mount Carmel region. The first of the ambulances has already arrived at the Locust Gap colliery. There will be 31 ambulances in the fleet.

Columbus, Ohio—With a view of securing adequate coal supply for next winter, the Columbus Railway, Power and Light Co. has purchased a mine in West Virginia, a stripping plant in the Hocking thin-vein district, several slack piles in the Hocking Valley, and is negotiating for a Hocking mine.

Columbus, Ohio—J. B. Dugan, chief inspector of the Ohio Utilities Commission, and other state officials are urging that general track connections be made between the Hocking Valley, Detroit, Toledo & Ironton and the Baltimore & Ohio in the Jackson field, with a view to securing three roads to serve every mine in that field.

Princeton, W. Va.—The Battleship Coal Co., recently incorporated with a capital of

\$150,000, is planning for the immediate development of 500 acres of coal lands to have a capacity of approximately 1200 tons daily. It is said that the company is considering the installation of a new 2300-volt central power plant and the construction of fifty miners' residences.

Charleston, W. Va.—The Consumers Smokeless Coal Co. has been issued a charter by the Secretary of State to develop 45,000 acres of coal lands on Gauley River, Fayette County. The company has an authorized capital stock of \$1,400,000. Its headquarters will be in Charleston. Among those interested are former Attorney General Abraham A. Lilly and S. A. Moore, of Charleston. The company expects to break ground within the next 90 days.

Pittsburgh, Penn.—The Pittsburgh Coal Co.'s gross receipts last year amounted to \$50,025,017, an increase of \$20,649,219 over the preceding year. Of this expenses and taxes absorbed \$31,555,468, according to the income account issued recently, and the net income after interest and depreciation charges had been met, was \$14,076,853, a gain of \$10,932,927. This was far and away the best profit the company ever had, the balance for dividends being equal to \$20.66 a share of stock outstanding.

Huntington, W. Va.—At a meeting of representatives of Ohio River cities held here on Mar. 1, plans were perfected for the organization of a \$300,000 corporation to build and operate a line of boats between Huntington and Cincinnati. The company will be known as the National Steamboat Co., and stock has been allotted to each city in proportion to its size and wealth. Four towboats, three passenger steamers and fifteen covered wooden barges will constitute the company's initial fleet.

Charleston, W. Va.—The State Council of Defense has appropriated \$4000 to be used along with \$20,000 donated by coal companies of the state for the purpose of having moving pictures made of the coal industry of West Virginia. The object is to have these pictures shown in various sections of the United States and foreign countries to show the conditions under which the coal is mined; the plants where the coal is handled; how it is transported by the railroads and what kind of homes and business houses are found in the mining communities, with the purpose of advertising the state's chief industry to the world.

Louisville, Ky.—According to reports from the eastern Kentucky field, in the Elkhorn district, the Louisville & Eastern and Louisville & Nashville lines will build at least six branches into as many new coal fields to be developed this summer. In several cases it is reported railroad building and development work has already started. One of the most important branch lines will be a six-mile section up Rockhouse Creek to Caudill's Branch, which will tap the operations of some six or seven new coal-operating concerns, including the Middle West Coal Co.'s mine. Adams & Sullivan, general construction engineers of Louisville, are building this branch.

Cleveland, Ohio—The Short Creek Coal Co., which has holdings of 7000 acres of coal lands in No. 8 fields, has been reorganized with the following officers: C. F. Branson, president; E. B. Thomas, vice president; R. Cunningham, treasurer; E. W. Long, secretary. The new directors are E. G. Tillotson, H. C. Robison, W. H. McFarland. The company now operates its Short Creek coal mine on the main line of the Wabash & Lake Erie and is planning for extensive developments of its land, on which the company has completed 7 miles of its own railroad. The Short Creek Coal Co.'s new mine, which is equipped to handle 4000 tons a day, will begin operations within the next 30 days.

New York, N. Y.—The Worthington Pump and Machinery Corporation, 115 Broadway, announces that the following appointments have been made, effective as of Mar. 1, 1918: James E. Sague, vice president, in charge of engineering and manufacturing; Leon P. Feustman, vice president, in charge of general commercial affairs, including contracts, prices, purchases, traffic, etc.; Frank H. Jones, vice president, in charge of sales; Edward T. Fishwick, general sales manager; Charles E. Wilson, assistant general sales manager; William Goodman, assistant to vice president; William Schwanhauser, chief engineer. The offices of the foregoing will be at 115 Broadway, New York. Neil C. Lamont has been appointed works manager, Laidlaw Works, with office at the works, Elmwood Place, Cincinnati, Ohio.

MARKET DEPARTMENT

Weekly Review

General Easing Up of the Coal Situation—Car Supply Still Hampers Production—Anthracite Not So Scarce as Bituminous—Little Contracting for Next Year's Requirements

PREVAILING good weather has brought about a general easing up of the coal situation. The worst of the domestic distress is now over, and there is practically no suffering. New England, however, is still facing the problem of procuring an adequate coal supply—a problem that will not be solved till more ships are pressed into service. The shipping now available totals about 216,000 tons, as against the 351,000 tons considered necessary to meet the normal needs of this territory.

Though showing progressive improvement from week to week, the supply of cars to the mines is still not what it should be, and operators are unable to produce at maximum capacity. The bituminous mines in the central Pennsylvania district are the greatest sufferers from this lack of cars, the miners in that region working only part time. The loaded coal cars that figured in the recent rail congestion are now being returned from tide-

water, and the near future should show a decided increase in the number of empties sent to the mines.

Deliveries of anthracite by rail continue to pick up, though river shipments are little better than the February average, and receipts at tide-water are about normal. There is an active demand for steam sizes, with no free coal to be had from the large operators. The Western markets are insistent in their plea for every pound of hard coal, as the Government has intimated that after Apr. 1 these markets will be asked to use bituminous coal from nearby regions.

Owing principally to the shortage of cars, the supply of bituminous coal continues to be unequal to the demand. True, there is a slight increase in production over previous weeks, but every ton is being quickly swallowed by a hungry market. Dealers are unable to accumulate reserve stocks as in former years, and it is hard to say when the shortage in soft coal will be over-

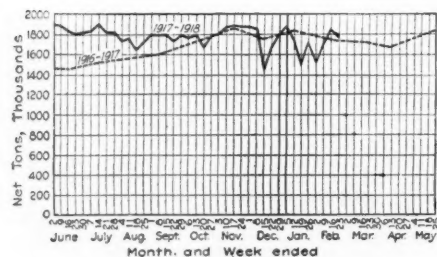
come. Not until the mines get more cars will the situation change.

Much speculation exists regarding the many plans for zoning and distribution. The Government's new price schedule is also awaited anxiously by the operators; and as for the dealers, they are marking time and wondering what will be in store for them after Apr. 1, the Government having shown that it is actually in control of both the wholesale and retail branches of the business.

There is practically no contracting for the new year, which begins Apr. 1. Consumers, of course, are eager to provide for their next winter's requirements, but Government regulations are against contracts unless the operators are willing to sign up at the present Federal prices. Furthermore, another hindrance to the making of contracts is the fact that they are subject to cancellation if the authorities desire to confiscate the coal for Government purposes.

COAL PRODUCTION

A decrease of 510,000 tons as compared with the preceding week marked the total bituminous output during the week ended Feb. 23. While this decline in gross output amounted to 4.6 per cent, it is difficult to interpret the rate of production per working day because of the unequal observance of Friday, Feb. 22, as a holiday. In plotting the curve of average production per working day, Washington's Birthday has been counted as a full working day. Next week, when reports will have been received from individual operators, it will be possible to make allowance for the effect of the holiday in reducing working time; the



decline in production from the week of the 16th to that of the 23rd from them appear less marked. The total production of beehive coke is estimated at 568,000 net tons, an average of 95,000 tons per working day. Shipments of anthracite amounted to 36,612 cars, a decrease of 9.9 per cent, as compared with the preceding week. Contrary to the custom of the anthracite districts, an effort was made to operate the mines on Washington's Birthday, but the number of men reporting for work was small.

Continued mild weather has effected a material improvement in operating conditions in the beehive-coke industry. Sixty-

seven of the principal operators in the Connellsville and adjacent districts of Pennsylvania reported a production of 253,855 net tons during the week of Feb. 23. The ratio of tonnage produced to capacity as rated by the railroads was 58.1 per cent., as compared with 53.2 per cent. during the preceding week. Indeed, the week's performance was the best since the week of Jan. 12. The same operators shipped 149,900 tons of coal.

CARLOADS OF COAL AND COKE ORIGINATING ON PRINCIPAL COAL-CARRYING ROADS

WEEK ENDED:

	Feb. 2	Feb. 9	Feb. 16	Feb. 23
Bituminous shipments, 121 roads...	170,552	181,586	199,984*	189,562†
Anthracite shipments, 9 roads...	34,482	32,611	40,661*	36,612†
Beehive coke shipments, 4 roads...	9,655	10,470	11,357*	11,657†

*Revised from last report. † Subject to revision.

Atlantic Seaboard

BOSTON

New England still faces problem of getting enough ships. Outlook continues discouraging. Little change in local restrictions. A steamer cargo intended for gas companies through Massachusetts had to be diverted for Boston local distribution. Much interest in "next season." Anthracite rail deliveries improve, but water shipments continue only a little better than the February average.

Bituminous—Present activities of those interested in getting coal for New England are centered upon more ships. If about 115,000 tons more can be allotted, and the coal can be produced for loading, it is estimated that the industries here can be kept running and have enough for emergency needs in communities where the supply of

anthracite fails. Aside from the importance of their output, in which the Government is vitally interested, there is a pronounced feeling that any enforced idleness in large mill centers like Lowell, Lawrence and Fall River would result in grave complications. While no manufacturer is being given more than a week's supply from the emergency receipts at the disposal of the fuel authorities, it is believed there will be no shutdowns for the present, unless calculations are upset.

Receipts have not appreciably increased during the past fortnight and most of the hopefulness one hears about is directly due to the less severe weather. Meanwhile, the plants and railroads where stocks were "ample" Jan. 1 are fast getting to the end of their tether. The number of distress cases will increase rather than otherwise as we near Apr. 1.

Large plants like the Bath Iron Works are working on very narrow margins and several of the pulp mills essential for newsprint paper are down to a fortnight's supply. The whole State of Maine, industrially, is in a very serious situation for lack of fuel. The Great Northern Paper Co., for instance, using 185,000 tons annually, is so far in the pulp wood country that it takes coal a long time to get there after ships are unloaded. To add to the complications, rehandling facilities at Portland are congested with other traffic, sulphur for paper mills and supplies for the Allies, and with quick discharge so vital an element in the supply of ships, it is feared that several cargoes relied upon for Maine points will not be delivered there.

The New York, New Haven & Hartford is now among the railroads showing anxiety over fuel supply. The Maine Central has more on hand than at any time since Jan. 1, due to ships being diverted from other consignments, but the Boston & Maine, the Central Vermont and the Boston & Albany are all dependent upon receipts almost from day to day. In order to give the Central Vermont an emergency supply the coal will have to be hauled over New Haven tracks from Providence to New

London because the ship available is too deep to berth at New London.

The matter of ships is being constantly kept before the Washington authorities, but other than two or three more "army boats" secured through the allied shipping control body at the request of the Quartermaster-General's department there are no important developments.

The Hampton Roads situation shows steady improvement. Over Saturday and Sunday, Feb. 23 and 24, 1305 cars were dumped. All of this was by no means for New England, but it shows that New England can rely upon better dispatch for the present, although there are signs of slackening again in the movement from the mines to tide.

All-rail deliveries have not increased in the same proportion, although reports are daily more encouraging. An effort is being made by the railroads to have an increasing tonnage flow to New York loading piers to be forwarded by boat to Bridgeport, New London, Providence, and even Boston, for distribution to inland points ordinarily reached all-rail. J. J. Storow, New England Fuel Administrator, approves of this plan and looks to see it increase the volume of coal for New England. The supply of box barges is sufficient, it is said, and of course one of the great hindrances to shipment all-rail into New England is the long haul to which cars are subjected, with no return load.

The Boston retail situation is still acute. A steamer cargo with high volatile that had already been parceled out on paper to gas companies was diverted to a Boston retail wharf for distribution, largely to domestic users. There are a number of Boston retail dealers with only a few tons of bituminous on hand and no anthracite. Fuel cards are now a regular institution.

The trade is much concerned over contracts and prices for "next season." Everything seems to hang on decisions of the fuel administration, although doubtless there will be a great many cases where buyers will place themselves in the hands of their usual contractors, leaving details to be worked out as the season develops. No contracts are heard all-rail, although on water business that can be handled over wharves owned by interests that also control coastwise tonnage there is still some quiet canvassing.

Anthracite—The movement of domestic sizes by water both from New York and Philadelphia is only slightly better than the February average, even though there seems to be a general impression that conditions are a lot improved. Loading has made a better showing the past fortnight, although in ordinary times it would be considered very poor. The outlook seems still unsettled, although a meeting of the operators' committee this week is expected to forecast some line of policy that will be followed by the companies during the year beginning Apr. 1. The trade here is entirely at sea over what is to happen, except that coal will certainly be hard to get in sufficient quantities.

NEW YORK

Entire coal situation is improved. Demand has lessened, but supplies are low. Dealers are optimistic and expect that the rush is over. Retail interests take hand in anthracite steam-coal situation. Investigation may result in closing up of private power plants. Dealers in bunker coals warned.

Anthracite—Conditions are far from normal, but the coal situation in this market is much easier as regards the domestic sizes, due in most part to the temperature and improvement in transportation facilities. Everywhere one hears of a freer movement of coal and there is not that insistent demand that predominated the market for several weeks past. However, wholesale dealers and shippers complain of the lack of supplies at the loading docks. This they account for in part by the heavy deliveries made to retail dealers, which in itself keeps the stocks on hand down to the minimum.

So far as the retail interests are concerned they are optimistic of the future. Most of them have small tonnages in their yards, and with the demand remaining as it is now they expect soon to have full bins. The demand upon them has lessened owing to the weather conditions, which as usual regulates the New York market probably more than any other coal market in the country. With warm days consumption dwindles and the dealers soon begin to feel the effects.

The trade is anxiously awaiting information concerning the plan formulated for distributing anthracite this spring and summer. While it was originally intended, according to an announcement, that the East should be taken care of first, it is un-

derstood that other sections of the country, particularly the West and Northwest, have put in their claims before the Fuel Administration officials and the special committee of anthracite operators selected to arrange the plan.

The matter of dirty coal continues to command the attention of national and state fuel administrators. It is understood that inspectors attached to their offices have received explicit instructions regarding poor preparation and that shipments not coming within requirements will be rejected. Reports from the anthracite regions are that since the fuel administrators have begun an investigation of the preparation of coal the shipments have been of a much higher quality.

Regulation of the anthracite steam-coal prices is likely to be urged upon the Fuel Administration by the retail interests here. Much complaint has been heard of the conditions surrounding this phase of the market and there are murmurings that some individual operators are asking for their product higher prices than the companies and other individual operators are quoting. There continues to be shortage of these coals, and as about everything coming here is already under contract the buyer looking for free coal finds it difficult to pick up a cargo.

No advices have been received so far with regard to the usual spring reduction of 50c. It is safe to say, however, that whether or not there will be a discount consumers will place their orders early.

The inquiry into the coal situation being conducted by the Board of Aldermen has developed testimony to the effect that the cellar peddler system ought to be controlled, if not entirely abandoned, and that a central plant where the poor could go and get their fuel would be better. The control of the peddler and cellar dealer was urged before the committee conducting the investigation by County Fuel Administrator Reeve Schley and by Harry T. Peters, who is chairman of the State Fuel Conservation Committee. It was also suggested that a good plan would be the establishment of a central heating plant for the distribution of heat and electricity.

There was a hearing before the Public Service Commission on Monday of this week with a view to looking into the advisability of closing down all private electric plants, thereby conserving the fuel supply. There was considerable opposition to the promulgation of the proposed order.

There were shipped for export from the Port of New York during January of this year 490 tons of anthracite as compared with 7934 tons exported in January of last year.

Current quotations, per gross tons, f.o.b. Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	\$6.30	\$7.05
Egg	6.20	6.95
Stove	6.45	7.20
Chestnut	6.55	7.30
Pea	5.05	5.80
Buckwheat	4.30@5.00	5.50@5.80
Rice	3.75@3.95	4.50@4.80
Barley	3.25@3.50	4.00@4.25
Boiler	3.50@3.75	.....

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight rates.

Bituminous—The situation is somewhat easier, but there is practically no free coal to be picked up in the New York harbor. Jobbers continue to anxiously await the official word from Washington which they believe will put them out of business. While it has been stated from what appears to be authoritative sources that Dr. Garfield intends to sign the order, there were rumors early this week that the final order would not be promulgated at this time. However, there was a much stronger belief that the order will be put into force on Apr. 1 as originally announced, notwithstanding the many protests.

The attention of the members of the Wholesale Coal Trade Association of this city has been directed to the complaints made of inferior coal furnished for bunkering purposes, both in New York and Philadelphia, and urging upon them the imperative necessity of furnishing only the best qualities of coal. It is recommended that coal be supplied only from the following pools: South Amboy, No. 9 and No. 10; Port Reading, No. 9, No. 10, No. 22 and No. 23; St. George, No. 22 and No. 23; Port Liberty, No. 9 and No. 23.

Operators in the Central Pennsylvania fields whose coal is wanted by the United States Shipping Board for bunker and export, and those whose coal is subject to priority orders, are receiving a better supply of cars than others. There is said to

be practically no distribution of coal for commercial purposes, the car supply for that purpose averaging between 10 and 15 per cent. Conditions along the Baltimore & Ohio are about the same, but along the New York Central car supply is much better.

It is likely that there will be little done toward closing contracts for the new coal year beginning Apr. 1. Consumers are anxious to provide for their requirements for the next year, but Government regulations are against contracts unless the operators are willing to sign up at the Government prices; and then the stipulations are subject to cancellation if the authorities desire to confiscate the coal for Government purposes.

The bunkering situation shows much improvement. There are comparatively few ships in the harbor and none of these is being detained because of the failure to secure coal. There is no spot coal here and contract coal is not moving freely, although most contract holders are obtaining enough to keep their plants in operation.

PHILADELPHIA

Anthracite retailers catch up with orders. Commission rules against stocking now, but modifies later. Shipments near normal. Hope 50% discount will be passed. New card delivery system. Coal inspections grow more drastic. Bituminous shows slight improvement. Situation still serious, with car supply the factor. Brokerage discussion continues.

Anthracite—Dealers are marking time and wondering what is in store for them after Apr. 1. They have been forced to realize that the retail as well as the wholesale branch of the business is now practically under Governmental control. This was again impressed upon them when the Chairman of the Federal Fuel Administration for Philadelphia on Feb. 27 issued a circular letter to all local dealers instructing them not to attempt to stock cellars, but to deliver coal for immediate use only.

In the same letter they were reminded that the whole system of coal distribution for the year beginning Apr. 1, 1918, will be regulated by the Government prior to that date and that the local fuel administration will not recognize or allow delivery of orders accepted prior to that date. This letter proved most disconcerting to the trade and immediately there was a storm of protest. After several representative dealers had carefully explained all the facts to Mr. Lewis they were given permission to use their own judgment and to commence delivering gradually, but were advised not to complete any large orders.

Receipts from shipping companies have assumed almost a normal aspect and are running from 12,000 to 14,000 tons of domestic sizes daily. Egg coal continues to accumulate to a limited extent in dealers' yards and stove displays just the least tendency to drag. The real demand, as is usual at this time of the year, is for chestnut and pea. With this falling off in demand for certain sizes has come a certain uneasiness among the individual shippers as to whether they can still maintain their prices at 75c. above the company shippers right up to the end of the month, when new prices are expected to be announced. Usually at this time the independents are compelled to quietly shade prices to move their entire output. The dealers are placed in a peculiar position, for they are anxious to buy their coal as cheaply as possible and naturally would cancel their high-priced orders, but when they consider that next winter they will need all the coal they possibly can get regardless of price, they hesitate to cut off any independent shipments.

Every one remains hopeful that the usual 50c. reduction will not be put into effect this year. The local fuel administration has been quoted as being opposed also to the 75c. differential allowed the smaller operators, but it is a noticeable fact that as a whole the retail dealers oppose any concerted action on their part as objecting to it. At a recent meeting of the dealers it was apparent that none was keen to request the authorities to equalize the prices.

Despite the greatly augmented shipments recently, numerous retailers who have been interviewed are practically unanimous in their determination to procure all the coal they can this month regardless of price. The possibility of a 50c. reduction will not deter them from buying all the coal they can store. At present quite a number of the smaller yards are carrying full stocks of certain sizes and requests to suspend shipments are growing more common. Of course, this will quickly cease when spring deliveries commence. These cancellations are not bothering the larger shippers for

outside markets continue extremely anxious for every pound of coal, especially Western points, which have been threatened by the Government with curtailment after Apr. 1, with the understanding that they must use bituminous coal from nearby regions.

At the suggestion of the local fuel administration a new system covering the retail deliveries of coal is to become operative with the first of next month. It is to be based upon information to be developed by a card questionnaire radically different from the one now in use. Complete data concerning household coal consumption will thus be obtained. The Coal Exchange, the local retail organization, will be delegated to keep the new cards and assume the responsibility for operating the bureau. In order to meet the expenses of the bureau a tax of 2c. a ton will be levied against the retail dealer on every ton delivered. The card will contain blanks to be filled with all details as to tonnage and sizes formerly used; whether hot-air, hot-water or steam-heating system is used. Every time coal is delivered the dealer will be required to make a report and each delivery will be tabulated. In this way a check will be had on every consumer; and it is hoped hoarding will be prevented and a stop put to the practice of "shopping" from dealer to dealer and leaving an order with all. It is also planned to make a survey of the city's industrial plants to determine how many are using domestic sizes and to what extent steam sizes or soft coal may be substituted. A great saving of family coal is expected from this investigation.

The dealers are greatly encouraged with the prospect of receiving more of Philadelphia's most popular size—pea coal—during the coming year. It has been learned that shippers who have contracts on this size expiring Mar. 31 will not renew them, but will reserve the coal for domestic use. The contracts were all with industrial plants and the fuel administration will not consent to their renewal.

Coal inspection by the Fuel Administration representatives continues. Dealers who delivered coal of inferior preparation to homes are being compelled to refund money or send an extra supply to their customers, gratis. This was done in seventeen cases in one day at the direction of the State Fuel Administration. Following this the dealers are refusing to receive poorly prepared coal from the shippers, and one dealer reported that because he had done this further shipments had been cut off. The fuel officials warned the shippers that this was a violation of the law and made themselves liable to prosecution under the Lever Act. In order to offset this phase as much as possible the State Administration has increased the number of inspectors at the breakers in the region.

Late in the week it was learned that in distributing coal to the trade during the coming year the tonnage shipped to the various dealers from April, 1916, to March, 1917, will be made the basis on which all calculations will be made for the coming fuel year.

Steam sizes continue in very active demand, with no free coal to be had from the large operators, and with the individuals making sales of the few cars of this kind they may have at the prices that have practically prevailed all winter, with \$4.15 being the highest price asked for buckwheat and very little to be had at this figure.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

Line	Tide	Line	Tide
Broken.....	\$5 90 \$6 05	Buckwheat.....	\$3 15 \$3 75
Egg.....	4 80 6 00	Rice.....	2 65 3 65
Stove.....	5 05 6 35	Boiler.....	2 45 3 55
Nut.....	5 15 6 40	Barley.....	2 15 2 40
Pea.....	3 75 4 65		

Bituminous—The supply continues unequal to the demand. It cannot be overlooked, of course, that weather conditions have been a wonderful help, but whatever increased production there has been has been quickly absorbed by a market long since bare. Yet while it is intimated that there has been a slight increase in production this output is far from what could be accomplished if the car supply were adequate. The greatest shortage continues to be in the Central Pennsylvania district, although there has been a considerable improvement over a month ago. From the Fairmont district and other southern fields entering this market the report of car supply is somewhat better, but far below what it should be. Taken in all its aspects the soft-coal situation continues to be extremely serious.

There seems now to be no particular objection to the new Government price, except only when it is considered in question with the brokerage problem. As is well known, practically all companies mining coal and who at the same time operate a sales department had quite a little tonnage for the brokers, which tonnage they were willing to continue, even though they could have marketed it all direct under present conditions. The brokers are making a hard fight and the outcome of their efforts is awaited with much interest.

There continues to be two prices for coal in this market, as so far there has been no change in the prices of coal from the southern fields. Some authorities consulted feel that a smaller allowance than the 60c. granted in Central Pennsylvania may be allowed there, but others, basing their opinion on the fact of less difficult mining conditions, believe that there will be no change in the immediate future.

BALTIMORE

The coal trade wonders how consumers are to take advice to lay in coal. Warmer weather aids movement, but many bins are entirely empty.

Bituminous—The milder weather has caused a let-up in the rush of domestic consumers for bituminous coal to take the place of anthracite. Many who tried soft coal in stoves and grates that were unsuited for burning that product have had more or less woeful experiences with soot-ridden homes and injured stoves, and are back to a "hard coal or nothing" basis in their demands. This lightened domestic demand and the fact that public service corporations and city emergency departments have been a little better supplied this week, has led to some diversion of bituminous to those industries hardest hit by fuel shortage. A number of firms, however, are still traveling on the narrow edge of supply and some are claiming that they are not able to get out full production because of lack of coal.

Anthracite—Supplies to arrive here are still vastly short of needs. The trade is wondering how the public is to take the advice of the Government and purchase coal for next winter. There is not a chance to get enough coal for even immediate needs, much less for storing. There may be relief under a new Government distribution plan after Apr. 1, but there is not a coal man here but would venture the prediction that next winter will be entered with consumers vastly short of needs.

Lake Markets

PITTSBURGH

Broader market. Jobbers are making sales. Supplies good in Youngstown district and fair in immediate Pittsburgh district. Uncertainty regarding new prices.

The most trustworthy evidence of the greatly improved relation between supply and requirements now obtained is found in the fact that some coal jobbers are now transacting a very fair amount of business. In the great majority of cases they are operating under a brokerage paid by the consumer, the producer receiving the full fixed maximum price; but in an occasional instance a brokerage is now being paid by producers, out of the set price.

The steel mills in the Youngstown district are now well supplied with coal, except that an interest here and there might be disposed to purchase a limited tonnage of high-grade gas coal. The immediate Pittsburgh district is fairly well supplied, but this condition is due chiefly to the resumption of river coal movement since the ice ran out. Rail deliveries to Pittsburgh are only moderately improved.

The trade has been unable to form any definite opinion as to what sort of price revision will occur Apr. 1 pursuant to the recent announcement of the Fuel Administration that there would be a revision by that date. The specific statement was that the allowance of a brokerage to be paid by the buyer, over and above the set price, would be discontinued, the brokerage in future to be paid by the producer, out of the set price, and that there would be an increase in the set price to cover selling expense. That would mean raising the present set price of \$2.45 for mine-run in the Pittsburgh district by all or part of the 15c. brokerage now allowed.

Nothing definite and practical has thus far been announced as to putting in operation the proposed general zoning system for distributing coal. There is a regular trading market, although rather a narrow one, now in existence, and of course at the set prices: Slack, \$2.20; mine-run, \$2.45;

screened, \$2.70; per net ton at mine, Pittsburgh district, with 15c. extra permitted to be charged in the case of sales made by brokers.

BUFFALO

Situation still perplexing. Coal more plentiful, but not well distributed. Anthracite demand not so keen, on account of the mild weather.

Bituminous—No change for the better is to be seen, for the mines still refuse to sell at the Government price if they can avoid it. The operators and the jobbers have a way of establishing offices in Canada and shipping a big percentage of their coal there, where the price is higher. This cuts down the amount to be had in the border towns, like Buffalo, and makes it hard to get coal enough to use. Everybody is dissatisfied; and the complaint against the regulations or practices without much regulation, is as great as it ever was.

Coal is still standing in quantity at railroad junction points and the rules have cut out the wagon production to a great extent and increased nothing, so that the situation can hardly be called promising. Mild weather and nothing else has averted a big disaster, as the local trade looks at it.

It is not easy to quote prices, especially as the bulk of the coal still goes on contract figures, but thick-vein Pittsburgh coal still is quotable on the basis of \$4.25 on cars here for lump and thin vein at \$4.45. Pittsburgh rail rate, for mine-run. So little attention is paid to these prices that jobbers hardly know how to quote them.

Anthracite—The situation does not change much, but the warm weather has so reduced the demand that the mines have been able to get along by cutting down the amount shipped this way. The local fuel authorities are now finding that most of the coal can be trusted to the retailers for distribution, though the disposition to hoard is still common. But for that there would not have been much shortage. There has been little or no suffering here in that line.

The lake trade, and especially the fixing of next season's terms and prices, is a source of much discussion in the anthracite trade now, but it is all uncertainty. There is a surplus of bituminous on the upper lake docks and the anthracite supply is supposed to be good there also, but the coal is all in the hands of consumers and the amount is not easy to determine. Nothing will be loaded for the lakes right away. The local consumers would complain of such tying up of fuel.

DETROIT

Transportation conditions improve with continuance of favorable weather. Fuel administration restrictions are partially relaxed.

Bituminous—Moderate temperatures continuing through the week have contributed materially in placing the transportation situation on a better basis, facilitating the clearing away of freight in congested districts along the coal carrying roads south and southeast of Toledo and releasing shipments of coal that have been delayed long in transit. This has the effect of increasing temporarily the quantity of coal coming into Detroit. Jobbers and wholesalers, however, are directing attention to the probable diminution of supply, within a week or 10 days, which is likely to result from shortening of car supply at the mines, while cars now being unloaded or awaiting unloading are being taken back for loading.

The present supply in the Detroit market, though of more satisfactory volume than for many weeks past, merely makes provision for day-to-day requirements of steam plants. Little or no opportunity has been afforded yet for stocking up and free coal on tracks is still conspicuously absent.

Weather conditions, besides effecting an improvement in transportation and supply, have brought relief from the pressing demands of domestic consumers, thus increasing the proportion of coal available for industrial consumption. The improvement in the general situation has been so marked that the Michigan fuel administration has revoked the nine-hour limit on business establishments and most of the drastic restrictions designed to save coal.

Anthracite—There has been a slight improvement in quantity of anthracite coming into Detroit. The supply still falls short of normal requirements. Warning has been issued to retail dealers by the Michigan fuel administration to guard against selling to individual consumers a larger amount of anthracite than is necessary for reasonable requirements to Apr. 1. The fact that the Federal Fuel Administration on the same date issued a recommendation that coal users at once make provision for future needs is an interesting coincidence.

COLUMBUS

Better supply of coal arriving in the local market and the stringency is now passed. Steam business is attracting considerable attention.

The coal trade in Ohio has been rather active during the past week, both in domestic and steam lines.

Pocahontas coal is exceedingly scarce and only a small amount of West Virginia splints are coming into the local market. The trade is depending largely on Hocking, both thin and thick vein, and on Pomeroy grades. Some Jackson is arriving, but it is not being used as extensively as formerly.

The steam business is active to the extreme. Manufacturing plants which were compelled to suspend operations for some time owing to lack of fuel are now being operated. Schools and public institutions are fully supplied. Some steam users have been able to lay in surplus stocks to act as insurance. Public utilities are especially active in stocking-up as they do not want to be caught short-handed again.

Lake trade is being considered both by shippers and dockmen. Few lake contracts have been made as yet, but all producers have received many inquiries. The disposition appears to be to let the matter of price rest with the Government. Vessel men are casting around for all available tonnage, as indications point to a rather active lake season, right from the start.

Production in Ohio fields has again shown an increase over previous weeks. This is especially true of the Hocking Valley, where the car supply has been excellent. Pomeroy Bend is credited with about 80 per cent. production while Massillon and Crooksville had about 75 per cent. In eastern Ohio the car supply is still lax and the output is estimated at 65 to 70 per cent. of normal.

Prices on short tons f.o.b. mines are as follows:

	Hock- ing	Pom- eroy	Eastern Ohio
Sized grades	\$2 70	\$3 05	\$2 70
Mine-run	2 45	2 70	2 45
Screenings	2 20	2 45	2 20

CINCINNATI

The situation continues to improve, aided by mild weather and a better car supply. Some coal has also arrived by river. Contract inquiry is already in evidence.

With a continuation of comparatively mild weather, and a much better car supply reported from most districts serving this section, the coal situation is rapidly improving, although as long as severe weather is a possibility coal men and the fuel authorities emphasize the fact that there might be a renewal of the recent shortage. Dealers are accumulating stocks, however, warned by the situation in which they were placed during the winter months, and will probably not again be found unable to supply their trade. Industrial consumers are again receiving coal more or less regularly on their contracts; and, on the whole, the situation is more nearly normal than it has been for several months. There is every reason to believe that there will be no cessation in the active demand for fuel, however, as the public and all classes of consumers had a drastic lesson during the winter, and buying for spring and summer delivery, for next winter's use, is certain to be on an unprecedented scale, especially as the authorities at Washington are now urging that consumers buy during the summer, instead of asking them to hold off as was the case last summer and fall. Jobbers remain somewhat disturbed over the intimation that Washington may cut off their profits, but it is believed that some adjustment of this threatened difficulty will be made.

LOUISVILLE

Prevailing good weather throughout the district has resulted in much lighter consumption. Dealers are carrying fair stocks, and are able to supply all demands. Western Kentucky production good. Eastern Kentucky showing improvement. Traffic conditions generally better and car supply larger.

Due to a better car supply, the eastern Kentucky mines in some localities have been able to operate three to four days a week, whereas two to three days has been the average for the greater part of the winter. A number of coal developments are being started, and indications are that many new companies will shortly start operation.

In the western Kentucky district the labor and car supply situation has shown considerable improvement, and a fair tonnage is moving from that district. While

several developments are under consideration there is no great amount of development activity in progress in the western section at the present time, it appearing as if most of the coal-land development in the state is now in the eastern section—in Perry and Letcher Counties—or in the Elkhorn district.

Retail dealers of Louisville are now enabled to make prompt deliveries on all grades of Kentucky coal, and are delivering orders placed before noon on the same day, if requested. Labor to unload and store coal is being obtained in fair quantities. The general domestic demand is fair for this season of the year, but as usual is for small quantities of from one-half to two tons for the most part.

Captain Shaw, of the Pittsburgh Coal Co., Louisville office, reports that there is practically no movement of coal tows down the Ohio this season, due to the fact that there is no coal to be had from the Allegheny district for southern or western delivery, as such coal is going into the Pittsburgh and other districts. There is an excellent boating stage on the Ohio, and plenty of boats, barges and tugs, as well as other equipment, but there is no coal to move by river at this time. Generally there is a heavy movement in February and March on high water. There may be some movement during the latter part of the month, however.

BIRMINGHAM

Tension in domestic channels has entirely disappeared and one-ton restriction has been removed. Steam situation unchanged, demand continuing strong. Slight gain in production over last week. Transportation facilities reported good.

All possibility of any further acute shortage developing in the domestic market this season having been abated, the fuel board at its last session removed the one-ton limit of sales to householders and is urging that consumers provide themselves during the spring and summer months with reasonable tonnage to carry them through next winter. The latest inventory from yards shows that stocks are gradually increasing and receipts of lump coal are improving. The demand upon the mines is good, but not so insistent as heretofore.

There is no easing up in the inquiries for steam coal and every ton that can be mined is being judiciously distributed. There seems to be no relief in sight for the tension that exists in the steam market, it being impossible under existing conditions to bring the output of the mines up to capacity production; and the supply is inadequate to meet all demands.

Coke

CONNELLVILLE

Some price advances in other districts. Improvement in car supply is slow. More promise. New system proposed for allotting cars promises better quality of coke.

The Fuel Administration has raised the set prices 75c. and \$1 a ton in the case of certain West Virginia districts, above the general level of \$6 for furnace and \$7 for foundry, while selected foundry coke made with washed coal from the lower bench of coal of the Upper Freeport seam, in Indiana County, Pennsylvania, is set at \$8.50 if the ash is under 10 per cent. and the sulphur under 9 per cent., the price being \$8 if either of these analysis limits is exceeded.

Car supplies have been improving slowly indeed, and while there is a progressive increase in shipments from week to week the gain in coke shipments in the past three or four weeks has been at the rate of not much more than 5000 tons a week, the shipments still being about 75,000 tons a week under the estimated requirements of the blast furnaces tributary to the region.

Pittsburgh & Lake Erie cars have been in practically full supply, but as they are not permitted to go off the road the number of customers is limited and occasionally it is not easy to find buyers for all the coke thus loaded. Consumers on other lines are still short of coke. The blast furnaces have been running fairly well in the past two or three weeks, at 75 per cent. or more of capacity, but were able to reach this rate only by reason of the considerable amount of coke that has accumulated along the lines and was moved forward to destination when the weather broke.

The market is rather narrow, but there are some transactions. The set prices govern: Furnace, \$6; foundry, 72-hour

selected, \$7; crushed, over 1-in., \$7.30, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Feb. 23 at 264,849 tons, an increase of 24,077 tons, and shipments at 297,578 tons, an increase of 12,219 tons.

Buffalo—The demand for all sorts of by-product coke for fuel is as great as ever and it promises to continue. The effort to turn out this in quantity is stimulated to the limit, though the price does not appear to have been crowded up much by the situation. No complaint comes from the iron furnaces, though they do not appear to have any understanding as to what the prices will be when the contracts run out. Many coal consumers appear to be glad that they are allowed by contract to pay more than the regulation price, as they stand a better chance of getting the coal; and it may happen that the big coke consumers will find some way still of keeping close to the ovens, as they have done right along.

Middle Western

GENERAL REVIEW

Conditions greatly improved. Car supply better. Movement of both loaded and empty cars more regular and uniform.

The past week has seen a vast change for the better in the Middle Western section. Weather conditions did not disturb transportation to any noticeable degree. During the week 2 in. of snow fell in the northern districts, but throughout central and southern Illinois the weather has been mild, thereby permitting mines that had cars to load maximum tonnage. Conditions at the large terminals, which for three months have been congested with coal, are better and the movement of both loaded and empty cars is easier and more regular. The last three days of February showed that production had reached normal again. However, production for the month is far below the corresponding month in 1917.

No contracts are being closed for the coming season. Jobbers do not know where their next season's supply is to come from, and producers are not anxious to contract, preferring to allow matters to drift for a while until they clear up the orders they have on file. Then, too, the matter of zoning has delayed the making of connections for next year.

Dr. Garfield's order eliminating the jobber's commission, after Apr. 1, still arouses much debate. The 15c. per ton allowed jobbers under the present working arrangement gives them sufficient margin to continue business. They contend that if this 15c. is eliminated and the demand continues to be as urgent as it has been for several months, there is little likelihood that they will be able to make connections with producers that have a sales organization of their own. The jobber who now has connection with a mine that has no sales organization is considered fortunate.

CHICAGO

Chicago trade easy, although there is a market for any grade of coal offered. Weather conditions favorable.

The coal trade is breathing a sigh of relief because milder weather and the ability to get a sufficient tonnage of coal to care for orders. Although most of the coal coming to this market is bituminous from the East, all classes of users are more than satisfied to be able to get high-grade southern Illinois coal. The domestic trade has eased off considerably during the week just passed, but industries are ready and anxious to replenish their depleted stocks, many of which were confiscated during January and February for the relief of distress. The volume of coal reaching this market from the extreme southern part of Illinois was never greater than now. Williamson, Franklin and Saline Counties are large shippers to this market. Eastern bituminous coal is still in demand, although there is some improvement in movement. Still the demand far exceeds the supply, and the uncertainty of the tonnage that will be available from the East continues to have the effect of helping Indiana and Illinois coal into apartment houses that heretofore would not consider storing Western coal. The anthracite market is irregular. Some dealers are getting more, others less than last year, although there is an improvement in the movement from the mine.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Williamson and Franklin	Saline and Harrisburg	Fulton and Peoria	Springfield	Carterville	Grundy, La- Salle, Bureau and Will
Steam lump.....	\$2.65@2.80	\$2.65@2.80	\$3.00@3.15	\$2.65@2.80	\$2.65@2.80	\$3.35@3.50
Domestic lump.....	2.65@2.80	2.65@2.80	3.00@3.15	2.65@2.80	2.65@2.80	3.35@3.50
Egg or furnace.....	2.65@2.80	2.65@2.80	3.00@3.15	2.65@2.80	2.65@2.80	3.35@3.50
Small egg or nut.....	2.65@2.80	2.65@2.80	3.00@3.15	2.65@2.80	2.65@2.80	3.35@3.50
Stove.....	2.65@2.80	2.65@2.80	3.00@3.15	2.65@2.80	2.65@2.80	3.35@3.50
Chestnut.....	2.65@2.80	2.65@2.80	3.00@3.15	2.65@2.80	2.65@2.80	3.35@3.50
Pea.....	2.65@2.80	2.65@2.80	3.00@3.15	2.65@2.80	2.65@2.80	3.35@3.50
Washed egg.....	2.65@2.80	2.65@2.80	3.00@3.15	2.65@2.80	2.65@2.80	3.35@3.50
Washed stove.....	2.65@2.80	2.65@2.80	3.00@3.15	2.65@2.80	2.65@2.80	3.35@3.50
Washed nut.....	2.40@2.55	2.40@2.55	2.75@2.90	2.40@2.55	2.40@2.55	3.10@3.25
Mine-run.....	2.15@2.30	2.15@2.30	2.50@2.65	2.15@2.30	2.15@2.30	2.85@3.00
Screenings.....	2.15@2.30	2.15@2.30	2.50@2.65	2.15@2.30	2.15@2.30	2.85@3.00
Washed slack.....	2.15@2.30	2.15@2.30	2.50@2.65	2.15@2.30	2.15@2.30	2.85@3.00

	Clinton and Sullivan	Knox and Greene	Eastern Kentucky	Pocah. and W. Va.	Smokeless Penna.	Hocking	West Va. Splint
Dom. lump.....	\$2.65@2.80	\$2.65@2.80	\$3.10@3.25	\$2.60@2.75	\$2.70@2.85	\$3.05@3.20	\$2.85@3.00
Steam lump.....	2.65@2.80	2.65@2.80	3.10@3.25	2.60@2.75	2.70@2.85	3.05@3.20	2.85@3.00
Egg.....	2.65@2.80	2.65@2.80	3.10@3.25	2.60@2.75	2.70@2.85	3.05@3.20	2.85@3.00
Small egg or nut.....	2.65@2.80	2.65@2.80	3.10@3.25	2.60@2.75	2.70@2.85	3.05@3.20	2.85@3.00
Mine-run.....	2.40@2.55	2.40@2.55	2.85@3.00	2.45@2.60	2.45@2.60	2.70@2.85	2.60@2.75
Screenings.....	2.15@2.30	2.15@2.30	2.60@2.75	2.10@2.25	2.10@2.25	2.55@2.70	2.35@2.50

MILWAUKEE

Extra delivery charge because of winter conditions abolished. Wisconsin's urgency call for additional supplies of soft coal to receive favorable response.

A practical reduction of 75c. per ton on all coal was made on Mar. 1, when the local fuel administration abolished the extra charge of that amount ordered on Jan. 17 to make up for increased cost of delivery because of snow and ice conditions. Otherwise rates remain undisturbed. About 10,000 tons of fire-damaged Pocahontas mine-run has been thrown upon the market by one dock company at \$7.75 per ton.

Wisconsin's urgency call for about 40,000 tons of soft coal to supplement present stocks sufficiently to make them last until the opening of lake navigation about the middle of April will receive favorable consideration, according to advices received from Washington by State Fuel Administrator W. N. Fitzgerald. No bituminous coal is being received at present, as the preferred list in Illinois is absorbing all the coal mined in that state. Anthracite is also being withheld from the West because of the needs of Eastern coast communities.

There is a disposition on the part of consumers to put in new supplies of coal at once, and the fuel administration office is the center of inquiries in this regard. All are advised to wait until lake receipts are resumed. Meanwhile a system of supply regulation to guard against "hogging" is being perfected. In the rural districts all signs point to a revival of wood burning to an extent which will have an appreciable effect upon coal consumption next winter.

Springlike weather continues to act as a sedative in coal circles and there is a refreshing relaxation from the tension of winter's tribulations.

ST. LOUIS

An unusual situation accounted for by weather conditions altogether. Steam unusually quiet, and nothing doing in domestic lines. Railroads showing slight improvement. Little Eastern coal and no Arkansas. Condition satisfactory to the consumer.

Continued mild weather has brought about a condition in the local market that is commencing to worry the producer. Louisville & Nashville still has an embargo in effect that prevents coal from going to Chicago and many other points where it is needed, with the result that the local market is glutted.

The Louisville & Nashville seems to pay no attention to the rules that govern the railroads, and it is time that something drastic is done to make an example of some of these roads that are openly violating unwritten laws that have a tendency to ease the fuel situation in sections where it is still somewhat acute.

The Illinois Central furnishes about two day's supply of cars for the mines on its lines and its service is entirely unsatisfactory to everyone concerned. The other roads are doing fairly well, both with equipment and service.

There is some slight improvement in the equipment furnished on most roads and conditions show slight improvement, but not what should be expected. It is openly commented on here by some coal men that the roads seem to be falling down, and without any just cause, unless it might be that it is in an effort to get the public discouraged with the Government supervision of the rail lines; but the fact remains that investigations fail to find any valid reasons for some of the delays and inconveniences caused by the carriers in this section.

In the Carterville district the working time has improved and equipment is somewhat better. The tonnage from this field still continues to go to Chicago and the North, and the railroads still draw heavily, so that there is no excess tonnage offered in this market from this field.

The same condition exists to a great extent in the DuQuoin field. The situation is much easier in the Mt. Olive field, and there has been an abundance of this coal on the open market in the past few days. The retail trade in St. Louis is stocked up heavily with this grade and the producers are finding markets farther away from home.

In the Standard field there seems to be a surplus in a general way in domestic coal and some sizes of steam. During the past week several operators have had some strenuous work in order to dispose of their tonnage, and it is shortly expected that the railroads will be able to buy coal under the market price from operators who would rather not cut the commercial price.

Washington intimates that St. Louis will get no Pennsylvania anthracite this year, and what can be gathered from the Arkansas operators would indicate that they will not have enough tonnage to ship any to this market. There is some early buying on the part of domestic consumers, but this is light as yet.

The prevailing market is, per net ton f.o.b. mine:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump.....	\$2.65@2.80	\$2.65@2.80	\$2.65@2.80
3x6-in. egg.....	2.65@2.80	2.65@2.80	2.65@2.80
2x3-in. nut.....	2.65@2.80	2.65@2.80	2.65@2.80
No. 2 nut.....	2.65@2.80	.....	.....
No. 3 nut.....	2.65@2.80	.....	.....
No. 4 nut.....	2.65@2.80	.....	.....
No. 5 nut.....	2.15@2.30	.....	.....
2-in. screenings.....	2.15@2.30	2.15@2.30	2.15@2.30
2-in. lump.....	.....	2.65@2.80	2.65@2.80
3-in. lump.....	.....	2.65@2.80	.....
Steam egg.....	2.65@2.80	2.65@2.80	2.65@2.80
Mine-run.....	2.40@2.55	2.40@2.55	2.40@2.55

	Williamson and Franklin County	Mt. Olive and Staunton
Washed:		
No. 1.....	\$2.65@2.80	\$2.65@2.80
No. 2.....	2.65@2.80	2.65@2.80
No. 3.....	2.65@2.80	2.65@2.80
No. 4.....	2.65@2.80	2.65@2.80
No. 5.....	2.15@2.30	2.15@2.30

Williamson & Franklin Co. rate is 87½c.; other fields, 72½c.

I. C. C. Decisions

The Commission, Division 2, in conference on Feb. 16, 1918, considered the following inquiries concerning demurrage charges and storage charges assessed by common carriers on the fuelless days designated in the order of the Fuel Administrator dated Jan. 17, 1918:

1. May the fuelless days designated by the Fuel Administrator be considered legal holidays as that term is used in the demurrage code?

2. Should demurrage charges be collected on a shipment such as asphalt which arrived at destination on Jan. 18 and which because of its consistency could not be unloaded without first being heated and which was not heated because of the shipper's understanding of the Fuel Administrator's order?

3. Should demurrage charges be collected on cars containing freight which could not be loaded or unloaded without the use of a derrick operated by power derived from fuel?

4. Should demurrage charges be collected on shipments to a large industrial concern which could not load or unload them without certain inter-plant switching which could not be performed without power derived from fuel?

5. Should storage charges be assessed on less-than-carload freight which was not removed because an industry completely ceased operation on the fuelless days as the result of its understanding of the Fuel Administrator's order and of the instructions of the local fuel administrator?

Held, as to the first question, that the fuelless days designated by the Fuel Administrator may not be considered legal holidays as that term is used in the demurrage code.

Held, as to the second and third questions, that a particular shipper's understanding of the Fuel Administrator's order is not conclusive, as different shippers may construe the order differently; and that in cases where power or heat derived from fuel is necessary and customary for loading or unloading property, cars arriving and set for loading or unloading on Jan. 18 should be treated exactly as though set for loading or unloading on Jan. 23. In other words, in the circumstances of these cases, no demurrage charge should be assessed.

Held, as to the fourth question, that demurrage charges should be collected on shipments to industrial concerns which failed to load or unload cars because it is alleged that they were prevented by the Fuel Administrator's order from using locomotives for inter-plant switching. The Commission does not consider that there was any prohibition upon the plant locomotives from using power where necessary for loading or unloading any more than there was a prohibition against the use of locomotives for general railroad business.

Held, as to the fifth question, that storage charges should be assessed on less-than-carload freight not moved because the industry ceased operation on the fuelless days as the result of its interpretation of the Fuel Administrator's order, or the instructions of the local Fuel Administrator.

General Statistics

CHESAPEAKE & OHIO

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for the month of December, 1917, and twelve months ending Dec. 31, 1917:

COAL

To	December 1917	December 1916	Twelve Months 1917	Twelve Months 1916
Tidewater (bituminous).....	365,703	470,367	5,396,288	5,367,468
East (bituminous).....	327,818	287,627	3,022,336	2,718,772
West (bituminous).....	1,157,690	1,049,591	15,540,865	16,111,778
Company's fuel (bituminous).....	183,203	203,025	2,292,363	2,308,884
From connections (bituminous).....	135,123	173,898	1,756,287	2,489,365
Total (bituminous).....	2,169,537	2,184,508	28,008,139	29,046,267
Anthracite.....	4,373	1,553	13,652	15,579
Total coal movement.....	2,173,910	2,186,061	28,021,791	29,061,846

COKE

To	December 1917	December 1916	Twelve Months 1917	Twelve Months 1916
Tidewater.....	.....	.....	207	1,211
East.....	11,022	10,206	138,996	151,381
West.....	22,771	27,887	262,198	294,198
From connections.....	12,394	8,391	99,939	103,313
Total coke movement.....	46,187	46,484	501,340	550,163

CURRENT PRICES—MATERIALS & SUPPLIES

IRON AND STEEL

FIG IRON—Below are the present quotations, with a comparison of a month and a year ago:

	Mar. 5, 1918	One Month Ago	One Year Ago
CINCINNATI			
No. 2 Southern foundry....	\$35.90	\$33.00	\$18.90
No. 2 Northern foundry....	35.90	35.95	21.76
NEW YORK			
No. 2X Northern foundry...	34.25	34.25	22.00
No. 2 plain Northern foundry	33.75	33.75	21.00
No. 2 Southern foundry....	37.25	37.25	22.00
BIRMINGHAM			
No. 2 Southern foundry....	33.00	33.00	16.00
CHICAGO			
No. 2 Northern foundry....	33.00	33.00	22.00
No. 2 Southern foundry....	37.00	37.00	....
PITTSBURGH			
Bessemer iron*	37.25	37.25	24.95
Basic iron*	33.95	33.95	20.95

*These prices include the freight charge from the valley to the Pittsburgh district. †Delivered Tidewater, New York.

STRUCTURAL MATERIAL—The following are the base prices, f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill	New York	St. Louis	Chicago
	Pittsburgh	Mar. 5, 1918	1918	1918
Beams, 3 to 15 in.	\$3.00	\$4.195	\$3.25	\$4.27
Channels 3 to 15 in.	3.00	4.195	3.25	4.27
Angles, 3 to 6 in. 1/4 in. thick	3.00	4.195	3.25	4.27
Tees, 3 in. and larger.	3.05	4.245	3.40	4.27
Plates	3.225	4.45	5.15	4.52

BAR IRON—Prices in cents per pound at cities named are as follows:

	Pittsburgh	St. Louis	Denver	Birmingham
Mar. 5, 1918.....	3.50	4.17	4.05	4.38

NAILS—Prices per keg from warehouse in cities named:

	Mill	St. Louis	Chicago	Birmingham	San Francisco	Dallas
	Pittsburgh	1918	1918	1918	1918	1918
Wire	\$2.70	\$4.30	\$4.85	\$4.25	\$4.60	\$4.50
Cut	2.70	5.25	4.85	4.40	6.15	....

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh	St. Louis	Chicago	Birmingham	San Francisco	Dallas
	Mar. 5, 1918	1918	1918	1918	1918	1918
Standard railroad spikes 1/2-in. and larger	\$3.90	\$2.65	\$6.00	\$5.00	\$5.30	\$6.25
Track bolts	4.90	3.25	8.90	6.25	7.45	6.75
Standard section angle bars	3.25	2.00	4.50	Premium	4.65	....

COLD DRAWN STEEL SHAFING—From warehouse to consumers requiring fair-sized lots, the following discounts hold:

	Cincinnati	Cleveland	Chicago	St. Louis	Denver	Birmingham
17 1/2 %	List	+10%	+10%	+35%	+20%	....

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill	Cincinnati	Chicago	St. Louis	Denver	Birmingham
	Pittsburgh	1918	1918	1918	1918	1918
Straight	\$5.25	\$6.30	\$6.50	\$6.25	\$7.50	\$6.25
Assorted	5.40	6.30	6.50-7.00	6.40	7.75	6.85

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	New York	St. Louis	Chicago	San Francisco	Dallas
	Mar. 5, 1918	1918	1918	1918	1918
4 in.	\$58.35	\$58.35	\$44.50	\$57.55	\$57.00
6 in. and over	55.35	55.35	41.50	54.55	54.00

Gas pipe and 16-ft. lengths are \$1 per ton extra.

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots \$c. per 100 lb. is charged extra:

	Pittsburgh	Chicago
	Mar. 5, 1918	1918
Standard bessemer rails....	\$60-65	\$38.00
Standard openhearth rails....	63-65	40.00
Light rails, 8 to 10 lb.	*3.135 (100 lb.)	52.00
Light rails, 12 to 14 lb.	*3.09 (100 lb.)	52.00
Light rails, 25 to 45 lb.	*3.00 (100 lb.)	50.00

OLD MATERIAL—Prices per net ton in Chicago and St. Louis (including delivery to buyer's works and freight transfer charges):

	Chicago	St. Louis
	Mar. 5, 1918	1918
No. 1 railroad wrought....	\$32.80	\$31.25
Stove plate	27.80	21.50
No. 1 machinery cast	27.80	26.00
Machine shop turnings....	17.80	17.00
Cast borings	17.80	16.50
Railroad malleable cast....	32.80	26.80

COAL BIT STEEL—Warehouse price per pound is as follows:

	New York	Cincinnati	Birmingham	St. Louis	Denver
	\$0.12	\$0.16 1/2	\$0.16	\$0.12	\$0.17

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham
Solid	14c.	14c.	15c.
Hollow	24c.	25c.	....

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh: basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

	Steel	Iron
	Black Galvanized	Black Galvanized
Inches 1/2, 3/4 and 1	44%	17%
1 1/2	48%	33 1/2 %
2 to 3	51%	37 1/2 %

BUTT WELD

	Steel	Iron
	Black Galvanized	Black Galvanized
2	44%	26%
2 1/2 to 6	47%	28%

LAP WELD

	Steel	Iron
	Black Galvanized	Black Galvanized
1/2, 3/4 and 1	40%	22 1/2 %
1 1/2	45%	36 1/2 %
2 to 3	49%	38 1/2 %

	Steel	Iron
	Black Galvanized	Black Galvanized
2	42%	30 1/2 %
2 1/2 to 4	45%	33 1/2 %
4 1/2 to 6	44%	32 1/2 %

From warehouses at the places named the following discounts hold for steel pipe:

	New York	Chicago	St. Louis
3/4 to 3 in. butt welded.....	38%	42.8%	40.1%
3 1/2 to 6 in. lap welded.....	18%	38.8%	36.1%

	New York	Chicago	St. Louis
3/4 to 3 in. butt welded.....	22%	27.8%	25.1%
3 1/2 to 6 in. butt welded.....	List	24.8%	22.1%

Malleable fittings, Class B and C, from New York stock sell at list price. Cast iron, standard sizes, 15 and 5 %.

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York	Cleveland	Chicago
	Mar. 5, 1918	1918	1918
Hot pressed square....	\$1.00	\$0.50	\$1.40
Hot pressed hexagon....	1.00	.50	1.20
Cold punched square....	1.00	.50	1.00
Cold punched hexagon....	1.00	.50	1.00

Semifinished nuts sell at the following discounts from list price:

	New York	Cleveland	Chicago
	Mar. 5, 1918	1918	1918
New York	40%	50-10%	....
Cleveland	60%	60%	....
Chicago	50%	65%	....
St. Louis	50-10%	....	....

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago	St. Louis
% by 4 in. and smaller	30%	50%	40-10%	40%
Larger and longer up to 1 in. by 30 in.	15%	40%	30-5%	35-5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

	New York	Cleveland	Chicago	St. Louis
New York	\$1.00	\$2.00	\$3.00	\$3.00
For cast-iron washers the base price per 100 lb. is as follows:				
New York	\$5.00	\$4.50	\$3.50	\$2.75

RIVETS—The following quotations are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel 1/2 and smaller.....	30%	35%	40%
Tinned	30%	35%	40%

*For less than keg lots the discount is 35%.

	New York	Cleveland	Chicago
Button heads, 1/2, 3/4, 1-in. diameter by 2 in. to 5 in., sell as follows per 100 lb.:			
New York	\$7.00	\$5.85	\$5.50
Coneheads, same sizes:			
New York	\$7.10	\$5.95	\$5.60

MISCELLANEOUS

GREASES—Prices are as follows in the following cities in cents per pound for barrel lots:

	Cincinnati	Chicago	St. Louis	Birmingham	Denver
Cup	7	5 1/4	6.1	7 1/2	10
Fiber or sponge	8	6	6.4	7 1/2	15
Transmission	7	6	6.4	7 1/2	15
Axle	4 1/2	4	3.3	....	5
Gear	4 1/2	4 1/2	6.5	7 1/2	8
Car journal	22 (gal.)	3 1/2	4.6	7 1/2	8

BABBITT METAL—Warehouse prices in cents per pound:

	New York		Cleveland		Chicago	
	1918	Year Ago	1918	Year Ago	1918	Year Ago
Best grade...	90.00	60.00	93.00	53.75	90.00	55.00
Commercial...	50.00	35.00	22.00	17.75	30.00	28.00

HOSE—Following are prices of various classes of hose:

	Fire			50-Ft. Lengths
				75c. per ft.
	Air			40%
	First Grade	Second Grade	Third Grade	
Underwriters' 2 1/2-in.				
Common, 2 1/2-in.				
1/4-in. per ft.	\$0.55	\$0.30	\$0.25	
Steam—Discounts from list				
First grade... 30%	Second grade... 30-5%	Third grade... 40-10%		

LEATHER BELTING—Present discounts from list in cities named:

	Medium Grade	Heavy Grade
St. Louis	45%	40%
Denver	40%	40%
Birmingham	35%	40%
Chicago	30-10%	40-5%
Cincinnati	40-10%	40%

RAWHIDE LACING—10% off list.**PACKING**—Prices per pound:

Rubber and duck for low-pressure steam.....	\$0.90
Asbestos for high-pressure steam.....	1.65
Duck and rubber for piston packing.....	1.00
Flax, regular .....	.90
Flax, waterproofed	1.10
Compressed asbestos sheet.....	1.00
Wire insertion asbestos sheet.....	1.20
Rubber sheet .....	.60
Rubber sheet, wire insertion.....	.90
Rubber sheet, duck insertion.....	.50
Rubber sheet, cloth insertion.....	.25
Asbestos packing, twisted or braided, and graphited, for valve stems and stuffing boxes.....	1.10
Asbestos wick, 1/2- and 1-lb. balls.....	.65 to .70

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York and St. Louis
Galvanized iron rigging.....	+ 20%
Galvanized cast steel rigging.....	List
Bright plain rigging.....	30%
Bright cast steel.....	17 1/2%
Bright iron and iron tiler.....	5%

MANILA ROPE—For rope smaller than 1/4-in. the price is 1/2 to 2c extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: 5/8-in., 8 ft.; 3/4-in., 6; 1/2-in., 4 1/2; 1 in., 3 1/2; 1 1/4-in., 2 ft. 10 in.; 1 1/2-in., 2 ft. 4 in. Following is the price per pound for 5/8-in. and larger, in 1200-ft. coils:

Boston	\$0.35 1/2	Kansas City	\$0.33 1/2
New York .....	.34	Los Angeles .....	.33 1/2
Chicago .....	.32 1/2	Seattle .....	.33 1/2
Denver .....	.33 1/2	St. Louis .....	.33
Birmingham .....	.37	Cincinnati .....	.33

PIPE AND BOILER COVERING—Below are discounts and part of standard lists:

Pipe Size	Standard List	Thickness	Price per Sq. Ft.
1-in.	\$0.27	1/4-in.	\$0.27
2-in.	.36	1-in.	.30
6-in.	.80	1 1/4-in.	.45
4-in.	.60	2-in.	.60
3-in.	.45	2 1/2-in.	.75
8-in.	1.10	3-in.	.90
10-in.	1.30	3 1/2-in.	1.05

85% magnesia high pressure..... 15% off
 For low-pressure heating and return lines..... { 4-ply.... 58% off
 { 3-ply.... 60% off
 { 2-ply.... 62% off

LINSEED OIL—These prices are per gallon:

	New York		Cleveland		Chicago	
	Mar. 5, 1918	One Year Ago	Mar. 5, 1918	One Year Ago	Mar. 5, 1918	One Year Ago
Raw per barrel	\$1.39	\$0.99	\$1.40	\$1.00	\$1.41	\$0.98
5-gal. cans	1.49	1.09	1.50	1.10	1.51	1.08

WHITE AND RED LEAD in 500-lb. lots sell as follows in cents per pound:

	Red		White	
	Mar. 5, 1918	1 Year Ago	Mar. 5, 1918	1 Yr. Ago
	Dry	In Oil	Dry	In Oil
25- and 50-lb. kegs	11.50	11.00	10.50	11.00
12 1/2-lb. keg	11.75	11.25	10.75	11.25
100-lb. keg	11.25	11.50	11.00	11.50
1- to 5-lb. cans.....	13.25	13.00	12.50	13.00

CALCIUM CARBIDE—Price f.o.b. cars at warehouse points in Eastern States is \$102.50 per ton for Union miners' lamp carbide, and \$97.50 per ton for Cameo miners' lamp carbide. Union sells in 25-lb. cans for \$1.46 per can.

COMMON BRICK—The prices per 1000 in cargo or carload lots are as follows:

Cincinnati	\$13.50	Birmingham	15.00
St. Louis, salmon.....	8.00	Denver	\$8.50

FUEL OIL—Price variable, depending upon stock. New York quotations not available owing to this fact. In Chicago and St. Louis the following prices are quoted:

	Chicago	St. Louis
Domestic light, 22-26 Baumé.....	5c.	none
Mexican heavy, 12-14 Baumé.....	7c.	7 1/2c.

PREPARED ROOFINGS—Standard grade rubbered surface, complete with nails and cement, costs per square as follows in New York and Chicago:

	1-Ply		2-Ply		3-Ply	
	c.l.	c.cl.	c.l.	l.cl.	c.l.	l.cl.
No. 1 grade.....	\$1.15	\$1.40	\$1.45	\$1.60	\$1.75	\$1.90
No. 2 grade.....	1.10	1.25	1.25	1.40	1.50	1.65

Asbestos asphalt-saturated felt (14 lb. per square) costs \$6.50 per 100 lb.

Slate-surfaced roofing (red and green) in rolls of 108 sq. ft. costs \$1.85 per roll in carload lots and \$2.10 for smaller quantities. Shingles, red and green slate finish, cost \$4.75 per square in carloads, \$5 in smaller quantities, in Philadelphia.

ROOFING MATERIALS—Prices per ton f.o.b. New York or Chicago:

	Carload Lots	Less Than Carload Lots
Tar felt (14 lb. per square of 100 sq. ft.).....	\$61.00	\$62.00
Tar pitch (in 400-lb. bbl.).....	15.00	16.50
Asphalt pitch (in barrels).....	29.00	30.50
Asphalt felt	60.00	62.00

STEEL SHEET PILING—The following price is base per 100 lb. f.o.b. Pittsburgh, with a comparison of a month and a year ago:

	Jan. 30, 1918	One Month Ago	One Year Ago
	\$4.50 to \$5.00	\$4.50 to \$5.00	\$2.60 to \$2.70

HOLLOW TILE—The price per 1000 in carload lots f.o.b. mine is as follows:

	4 x 12 x 12	8 x 12 x 12
St. Louis	\$79.00	\$135.00
Chicago	79.00	137.00
Denver, per ton	110.00	200.00
Kansas City	58.00	112.00
St. Paul	55.00	138.00
Boston	95.00	171.00
Birmingham	56.80	103.50
Cincinnati	68.80	129.00

LUMBER—Price of yellow pine per M in carload lots:

	1-In. Rough, 10 In. x 16 Ft.	2 In. T. and G. 10 In. x 16 Ft.	8 x 8 In. x 20 Ft.
St. Louis	\$34.00	\$29.00	\$33.00
Birmingham	27.00	28.50	25.00
8 x 8-In. x 20 Ft. and Under			
	Y.P.	Fir	Hemlock
Boston	\$52.50	\$52.50	\$40.00
Cincinnati	35.00	...	...
Kansas City	35.25	36.00	...
Seattle	23.00	23.00	23.00
New Orleans	28.00	...	...
St. Paul	51.00	40.00	40.00
Denver	37.00	...	33.00
Atlanta	25.00	...	...
San Francisco	28.00	28.00	28.00
1-In. Rough, 10 In. x 16 Ft. and Under			
	Y.P.	Fir	Hemlock
Boston	\$45.00	\$50.00	\$50.00
Cincinnati	35.00	...	...
Kansas City	44.75	52.00	52.00
Seattle	23.00	23.00	23.00
New Orleans	35.00	...	...
St. Paul .....	...	46.00	39.00
Denver	35.00	32.00	32.00
Atlanta	18.00	...	...
San Francisco .....	...	28.00	28.00

COPPER WIRE—Prices per 1000 ft. for rubber-covered wire in following cities:

	Denver		St. Louis		Birmingham	
No.	Single	Double	Single	Double	Single	Double
14	\$10.90	\$15.15	\$27.25	\$13.50	\$16.25	\$31.25
10	23.70	27.05	49.35	25.00	28.50	56.40
8	33.60	37.35	74.45	34.85	38.85	74.70
6	...	57.15	...	59.75	64.25	...
4	...	81.70	...	84.40	84.90	...
2	...	121.80	...	125.50	132.00	...
1	...	158.50	...	163.00	171.15	...
0	...	189.40	...	216.00	225.00	...
00	...	298.05	...	263.00	273.50	...
000	...	362.15	...	320.00	331.50	...
0000	...	448.50	...	388.50	400.50	...

EXPLOSIVES—Price per pound in small lots at cities named:

	Low Freezing 20%		Gelatin 40%		Black Powder*	
	20%	40%	60%	80%		
New York	\$0.27 1/2	\$0.27 1/2	\$0.34 1/2	\$0.43 1/2	\$2.50	
Boston .....	...	...	...	...	...
Cincinnati	\$0.21 3/4	...	...	...	...
Kansas City .....	.20	...	...	...	...
New Orleans .....	...	...	...	...	...
Seattle .....	...	...	...	...	...
Chicago .....	...	...	...	...	...
St. Paul .....	...	...	...	...	...
St. Louis .....	...	...	...	...	...
Denver .....	...	...	...	...	...
Dallas .....	...	...	...	...	...
Atlanta .....	...	...	...	...	...
San Francisco .....	...	...	...	...	...

*Carload price.

FREIGHT RATES—On finished steel products in the Pittsburgh district, including plates, structural shapes, merchant steel, bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains, etc., the following freight rates are effective in cents per 100 lb.:

Boston	21.5	Minneapolis	35.5
Buffalo	11.6	New Orleans	30.7
Chicago	21.5	New York	19.5
Cincinnati	18.5	Philadelphia	18.5
Cleveland	13.5	St. Louis	27.0
Denver	79.0	St. Paul	35.5
Kansas City	47.0	Pacific Coast (all rail)	90.0